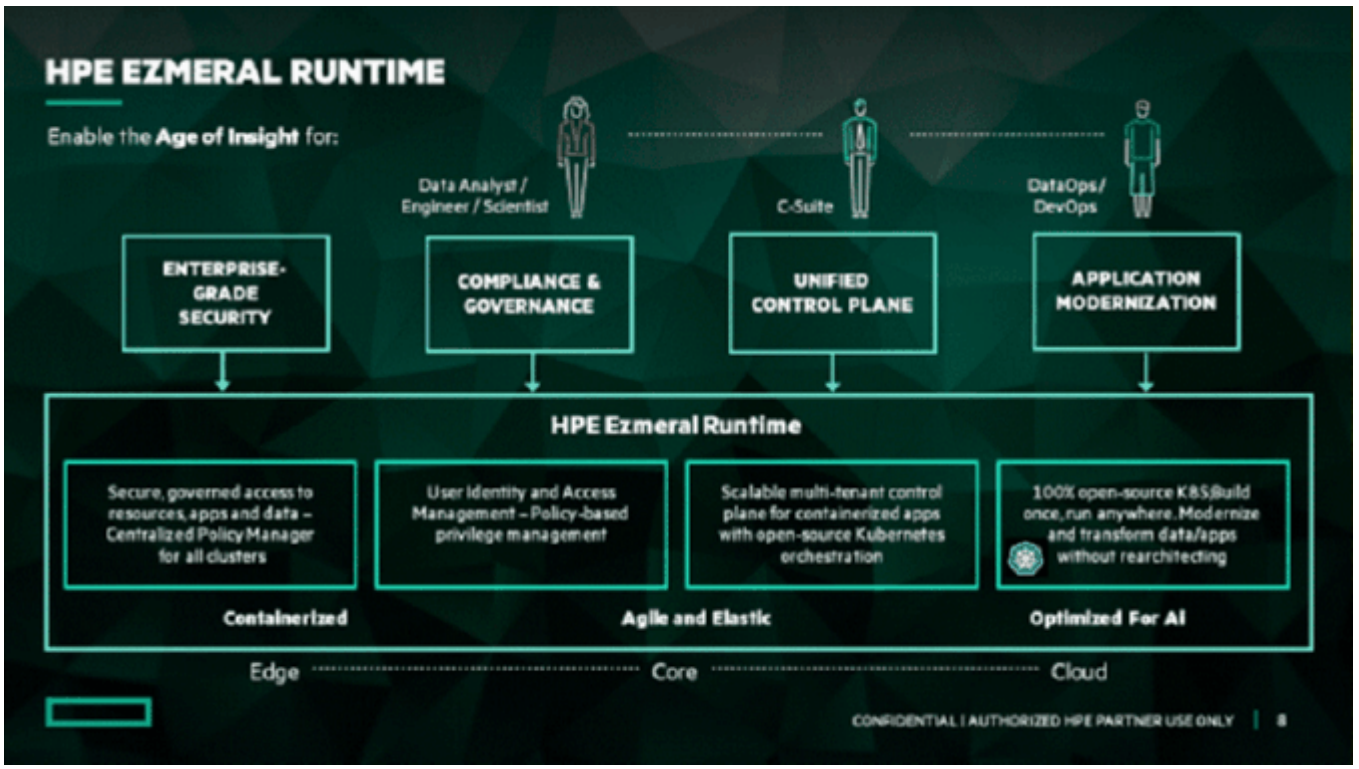
HPE Ezmeral Runtime Enterprise

Gartner estimates that 90% of enterprises will have containerized applications in production by 2026-up from 40% today. In addition, by 2026, 20% of all enterprise applications will run in containers-up from fewer than 10% in 2020. These enterprise organizations are adopting containers and embracing a cloud-native micro-services architecture to accelerate the speed of application development and innovation, while also benefiting from greater efficiency and portability. Kubernetes has emerged as the de facto open-source standard for container orchestration and is now a fundamental building block for cloud-native architectures.

While it is straightforward to deploy modern, cloud-native applications in containers, these represent a small portion of enterprise applications. Most enterprise applications are still non-cloud-native, typically with a monolithic architecture and persistent data storage. These non-cloud-native monolithic applications could benefit from the agility and efficiency that containers can introduce to the enterprise. The challenge is how to run these monolithic applications in containers, without re-architecting them. As enterprise organizations extend the use of containers and Kubernetes beyond development and testing to production environments, they need to address key considerations including security and data persistence.
In addition, application modernization is a driving differentiator in enterprises. The next wave in modernizing the data estate-both on-premises and in the cloud-is being driven by the need to support business, infrastructure, and digital transformation efforts. This modernization is needed to deliver greater business agility, improved efficiency, and enhanced innovation. Enterprises must be ready to ride this wave by accelerating their investment in containerized cloud-native infrastructure.
HPE Ezmeral Runtime Enterprise is an enterprise-grade container orchestration platform that is designed for the containerization of both cloud-native and non-cloud-native monolithic applications with persistent data. It deploys 100% open-source Kubernetes for orchestration, provides a state-of-the-art file system and data fabric for persistent container storage, and provides enterprises with the ability to deploy non-cloud-native AI and Analytics workloads in containers. Enterprises can now easily extend the agility and efficiency benefits of containers to more of their enterprise applications-running on either bare-metal or virtualized infrastructure, on-premises, in multiple clouds, or at the edge.
HPE Ezmeral Runtime Enterprise includes technical innovations from Hewlett Packard Enterprise, together with open-source Kubernetes for orchestration. These innovations include a proven system for deploying non-cloud-native AI and Analytics applications in containers, as well as a state-of-the-art file system and data fabric for persistent container storage.

HPE Ezmeral Runtime Enterprise



HPE Ezmeral Runtime Enterprise control plane

HPE Ezmeral Runtime Enterprise contains the following new feature enhancements with the version 5.7 release:

Products	Features
HPE Ezmeral Runtime Enterprise	1. Support for RHEL 8.10 , SLES 15 SP5 Operating Support 2. Support for Kubernetes 1.29, 130, and 1.31 3. Support for latest versions of open-source components 4. Support for external HPE Ezmeral Data Fabric on Bare Metal 7.8
HPE Ezmeral Runtime Analytics for Apache Spark	1. Spark versions supported: Apache Spark 1.3.8.1.1 compatible with HPE Ezmeral Data Fabric 7.0 2. Enhanced Spark Operator to support open source Apache Spark 3.3.1
HPE Ezmeral ML Ops	1. KubeFlow 1.8

Support for RHEL 8.10 , SLES15 SP4
5.7.0 release of HPE Ezmeral Runtime Enterprise (ERE) adds support for RHEL 8.10 and SLES 15 SP3
Support for Kubernetes 1.29,1.30,1.31
5.7.0 release of HPE Ezmeral Runtime Enterprise (ERE) adds support for Kubernetes Cluster

Standard Features

versions1.29.9-hpe1, 1.30.5-hpe1, and 1.31.1-hpe1. These versions are based on HPE's own Kubernetes distribution, hence the "-hpe1" suffix.

Support for latest versions of open-source components
5.7.0 release of HPE Ezmeral Runtime Enterprise (ERE) adds support for latest versions of open-source components including, but not limited to:

- Airflow (2.4.3)
- ArgoCD (2.5.2)
- Istio (1.17.2)
- Kubeflow (1.8)
- Open Policy Agent Gatekeeper (3.10.0)
- Falco (0.33.0)
- NVIDIA GPU Metrics (6.6.3)
- NVIDIA plugin (0.12.3)
- Kubernetes Dashboard (v2.7.0)
- Apache Spark 3.3.1

Support for external Ezmeral Data Fabric on Bare Metal 7.
5..7.0 release adds support for HPE Ezmeral Data Fabric 7.8
HPE Ezmeral Analytics for Spark (features in 5.7 release)

- Support for Apache Spark 3.3.1 compatible with HPE Ezmeral Data Fabric 7.0 : Includes secure access to read and write data from HPE Ezmeral Data Fabric based on the user identity.

HPE Ezmeral MLOps (new features in 5.7 release)

- Support for KubeFlow 1.8: Users can take advantage of latest innovations in latest KubeFlow Open Source End-End Machine Learning platform which is installed and configured with a single-click of a button.

Core platform features that are release independent:

- **Multi-cluster Kubernetes management -** Fast, easy deployment, management, and monitoring of Kubernetes clusters with out-of-the-box configuration of networking, load balancing, and storage
- **Hybrid deployments -** The ability to deploy on any infrastructure-on-premises, in multiple public clouds, or on the edge
- **Pre-integrated with persistent container storage -** Pre-integrated, scale-out, edge-ready persistent storage with HPE Data Fabric. HPE Ezmeral Runtime Enterprise's DataTap and FSMount features provide connectivity to external data without copying data locally.
- **100% open-source Kubernetes -** With innovations from HPE Ezmeral Runtime Enterprise such as KubeDirector-an open-source Kubernetes-based controller to deploy non-cloud-native apps.
- **Enterprise-grade security and control -** Integrations into enterprise security and authentication services with support for high availability, fault tolerance, and resiliency for mission-critical enterprise applications
- **Istio Service Mesh** - Modern applications are built for modularity, portability and scale, using micro-services. However, the growth of micro-services introduces several challenges, including secure communication between services, traffic routing, tracing, monitoring and troubleshooting performance. Istio is a popular service mesh that enables connectivity, security, control, and the ability to observe services. Istio enables many use cases, including traffic management between and across versions of services, to securely authenticate service end points, load balancing, collection of monitoring and other useful metrics to track the performance bottlenecks. Istio will be enabled out of the box.
- **HPE Ezmeral ML Ops on Kubernetes** - HPE Ezmeral ML Ops brings the power of Kubernetes pods

Standard Features

and Docker containers to the entire machine learning lifecycle to allow you to build, train, deploy, and monitor machine learning (ML) and deep learning (DL) models. HPE Ezmeral ML Ops supports sandbox development (notebooks), distributed training, and the deployment of trained models in production. Project repository, source control, and model registry features allow seamless collaboration.

- **Registering Bare Metal Data Fabric as Tenant Storage -** Support for registering Bare Metal HPE Ezmeral Data Fabric 7.8 and earlier versions as tenant storage on HPE Ezmeral Runtime Enterprise. HPE Ezmeral Data Fabric 7.8 registration is supported on HPE Ezmeral Runtime Enterprise 5.7.0. HPE Ezmeral Data Fabric on Bare Metal is an implementation of HPE Ezmeral Data Fabric that is on physical or virtual machines that are not part of the HPE Ezmeral Runtime Enterprise deployment.
- **Apache Spark integration** - We've expanded our capabilities and support of the most popular open-source data analytics and engineering offering. With the Apache Spark operator natively integrated, we now allow our clients to better leverage GPUs and directly access data from S3. With Livy integration, we enable users to simplify job submission from external locations like a Juypter notebook or terminal. Users can also leverage the Airflow workflow engine to manage data processing and data science pipelines.
- **Simplified ML Ops collaboration for multi-tenant environments** - With out-of-the-box MLFlow integration, we now have a global shared common metadata store with experimentation and model management capabilities. Global shared repository enables sharing of model metadata and related artifacts across tenants. In addition to the ability to share metadata across tenants, we've also added global data sharing allowing data to be shared across tenants.
- **Simplified policy management** - Our centralized policy management allows clients to adhere to corporate standard policies with the OPA (Open Policy Agent) rule engine and apply the policies across tenants and clusters. We've also added policy drift management which automatically detects and reports out of compliance clusters.
- **Runtime Security out of the box with HPE Ezmeral Runtime Enterprise** - Falco integration provides anti-virus-like security management for runtime containers.

HPE Ezmeral Runtime Enterprise will also continue to deliver the following functionality:

- Containers provide the core runtime abstraction for the user applications. These containers provide isolation between user applications and the rest of the infrastructure. The containers are based on Docker.
- The Resource Management and Orchestration Layer is the core operational component in the system. This layer is responsible for allocating resources to applications and creating and monitoring container instances to execute those applications.
- Tenants are an abstraction that provides multi-tenancy capabilities by grouping container instances. Containers associated with a tenant are isolated from other tenants at the network, compute, and storage levels.
- IOBoost is a feature that ensures performance comparable to bare metal in a containerized environment.
- The Virtual Network Layer is responsible for dynamically assigning network addresses to container instances, supporting tenant isolation at the network level, and managing connectivity between container instances and external networks.
- Node Storage provides local storage for a container instance while it is running. This storage is ephemeral and is removed when a container instance completes.
- DataTaps provide access to remote storage for containers. DataTaps are associated with a tenant, so

Standard Features

multiple applications and containers can share a DataTap while the DataTap is isolated from other tenants.
- Tenant Storage is a DataTap that provides persistent shared storage accessible by all nodes within a given tenant. The underlying filesystem utilizes HPE Data Fabric but is also compatible with HDFS and the physical storage is allocated from the Storage Infrastructure.
- NFS access to remote storage is available through NFS DataTaps and FSMounts.

Benefits

Bring the speed and efficiency of containers to both cloud-native and non-cloud-native apps (i.e., legacy)

- A turnkey solution that brings consistent processes and common services to both cloud-native and non-cloud-native apps
- Delivers improved agility, increased efficiency, and a cloud-like experience to non-cloud-native apps - without re-architecting them
- Offers greater parity for application developers working with monolithic non-cloud-native apps
- Uses 100% open-source upstream Kubernetes (K8s)
- Provides a common container orchestration platform

Lower costs with bare-metal containers and reduce risk with enterprise grade security

- Provide an integrated container orchestration platform with Kubernetes that addresses networking, load balancing, storage, security, and access controls
- Eliminate the cost and performance overhead of virtualization "tax" with bare metal containers
- Reduce infrastructure costs with bare-metal containers by increasing resource utilization
- Ensure multi-tenant security isolation, with AD/LDAP integration and authentication Improve efficiency through compute / storage separation - with containerized compute services and secure access to a shared data fabric
- Support high availability, fault tolerance, and resiliency for enterprise workloads
- Enable governance and control with management consoles for operations, con?guration, and monitoring

Deliver new code releases faster container deployment

- Boost developer productivity with a simpli?ed self-service experience and one-click deployment
- Quickly deploy multiple open-source Kubernetes clusters and multiple Kubernetes versions, with no modi?cation to native Kubernetes experience
- Automation and lifecycle management to easily create and reproduce Kubernetes clusters
- Instantly spin up test, development, and production environments with out-of-the-box templates for cloud native and non-cloud-native applications

Build once and run anywhere, providing hybrid cloud portability

- A uni?ed control plane to rapidly build and deploy applications anywhere - in your data center, on any public cloud, and at the edge.
- Leverages portability of containers to run on any infrastructure (HPE or non-HPE) and any public cloud
- Supports container deployments on bare-metal, VMs, or cloud instances
- Edge ready, for distributed applications at the enterprise edge.
- Mitigates data gravity and latency issues, by enabling app development near the data
- Reduces friction to move apps and data, and eliminates data egress from public cloud costs

Standard Features

The Data Platform Cluster as part of the HPE Data Fabric for Kubernetes provides the following benefits

- Independent and elastic scaling of storage and compute
- Ability to run different versions of Spark applications using the same data platform
- Deployment of multiple environments with resource isolation and sharing as required

HPE Ezmeral Runtime Enterprise continues to provide the following benefits

Access Data Regardless of Location

With HPE Ezmeral Runtime Enterprise's DataTap capability, you can access data regardless of location, from any shared storage system (including HDFS as well as NFS) or cloud storage (e.g., Amazon S3). This means you don't need to make multiple copies of data or move data, before running your analysis. Sensitive data can stay in your secure storage system with enterprise-grade data governance, without the cost and risks of creating and maintaining multiple copies or moving large-scale data.

Secure Multi-Tenancy

Different project teams, groups, or departments across the enterprise can share the same infrastructure-and access the same data sources-for their AI and Big Data analytics workloads. HPE Ezmeral Runtime Enterprise provides multi-tenancy and data isolation to ensure logical separation between each project, group, or department within the organization. The platform integrates with enterprise security and authentication mechanisms such as LDAP, Active Directory and Kerberos and when deployed on the highly secure HPE Apollo systems provides a best-in-class secure environment for deploying Big Data solutions

HPE Ezmeral Runtime Enterprise for Apache Spark

HPE Ezmeral Runtime Analytics for Apache Spark augments the full-featured HPE Ezmeral Runtime Enterprise with Apache Spark for big data processing, with built-in modules for streaming, SQL, machine learning, and graph processing.

HPE Ezmeral Runtime Enterprise and HPE Ezmeral ML Ops Capabilities Matrix

Standard Features

	HPE Ezmeral Runtime Enterprise	HPE Ezmeral MLOps
ERE Management Plane	Yes	Yes
Managed Gateway	Yes	Yes
Authentication Proxy	Yes	Yes
Air-gap Support	Yes	Yes
Logging (Elastic Search)	Yes	Yes
Metrics (Elastic Search)	Yes	Yes
Alerts (Nagios)	Yes	Yes
AD/LDAP/SAML/OIDC	Yes	Yes
Host Management	Yes	Yes
Kubernetes multi version	Yes	Yes
Kubernetes Dashboard	Yes	Yes
Kubernetes Upgrade	Yes	Yes
Container Network Interface (CNI)	Yes	Yes
Service Mesh (Istio)	Yes	Yes
Tenant Management	Yes	Yes
Data Tap (DTAP)	Yes	Yes
Tenant share (FS Mount), tenant storage	Yes	Yes
Operating Systems (OS)	Yes	Yes
RHEL OS	Yes	Yes
SLES OS	Yes	Yes
GPU support for Kubernetes hosts	Yes	Yes
Storage	Yes	Yes
Persistent Storage (Data Fabric with CSI)	Yes	Yes
Global Storage	Yes	Yes
Web Terminal	Yes	Yes
Policy Management	Yes	Yes
Runtime Security (Falco)	Yes	Yes
Stateful Applications with KubeDirector	Yes	Yes
Machine Learning Capabilities		Yes
KubeFlow		Yes
Airflow		Yes
MLFlow		Yes
KubeDirector Apps		Yes
– Notebook		Yes
– Training		Yes
– Deployment		Yes
– Tensorflow App		Yes

Consume IT on your terms

HPE GreenLake brings the cloud experience directly to your apps and data wherever they are-the edge, colocations, or your data center. It delivers cloud services for on-premises IT infrastructure specifically tailored to your most demanding workloads. With a pay-per-use, scalable, point-and-click self-service experience that is managed for you, HPE GreenLake accelerates digital transformation in a distributed, edge-to-cloud world.

- Get faster time to market
- Save on TCO, align costs to business
- Scale quickly, meet unpredictable demand
- Simplify IT operations across your data centers and clouds

Managed services to run your IT operations

HPE GreenLake Management Services provides services that monitor, operate, and optimize your infrastructure and applications, delivered consistently and globally to give you unified control and let you focus on innovation.

HPE Ezmeral Platform Services

HPE Ezmeral Deployment & Integration Services coordinates the app images planning, design, development, configuration, and validation of the customers new to HPE Ezmeral Platform solutions. During the pandemic, services are being delivered remotely with access to the customer's environment or collaboratively with the customer's personnel, to help the customer quickly leverage the features and benefits of the HPE Ezmeral Platform. After purchase, an HPE Ezmeral services specialist is assigned to work with the customer to help deploy and integrate their new HPE Ezmeral Software with the Customer's IT infrastructure. In addition, the HPE Ezmeral services specialist also works with the customer to provide valuable knowledge transfer that can help them quickly take ownership of the new HPE Ezmeral solution.

Ezmeral Training

HPE data and analytics training delivers the skills and expertise for success with Big Data, containers, AI/ML and deep learning-including HPE Ezmeral and HPE Data Fabric. Live virtual instructor-led and eLearning courses are available.
For more information:

- **Data and Analytics Courses**

Ordering Information

HPE Ezmeral Runtime Enterprise Subscription Options

BRIM SKU

Description	SKU
HPE Ezmeral Runtime Enterprise Essentials E-LTU	R9J34AAE
HPE Ezmeral Runtime Enterprise E-LTU	R9J35AAE
HPE Ezmeral Runtime Enterprise Analytics for Apache Spark E-LTU	R9J38AAE
HPE Ezmeral Runtime Enterprise Imported Cluster Manager E-LTU	R9J39AAE

S4 SKU

HPE Ezmeral Runtime Enterprise 1-year 24x7 E-LTU	S0M13AAE
HPE Ezmeral Runtime Enterprise 2-year 24x7 E-LTU	S0M14AAE
HPE Ezmeral Runtime Enterprise 3-year 24x7 E-LTU	S0M15AAE
HPE Ezmeral Runtime Enterprise 4-year 24x7 E-LTU	S0M16AAE
HPE Ezmeral Runtime Enterprise 5-year 24x7 E-LTU	S0M17AAE

Notes:

- HPE Ezmeral Runtime Enterprise software is licensed by the number of unique cores available to the kernel in the OS on which the HPE Ezmeral Runtime software is directly installed, regardless of the number of threads in each core.
- All servers, virtual and physical, require licensing with the exception of HPE Ezmeral Runtime Enterprise Gateway servers

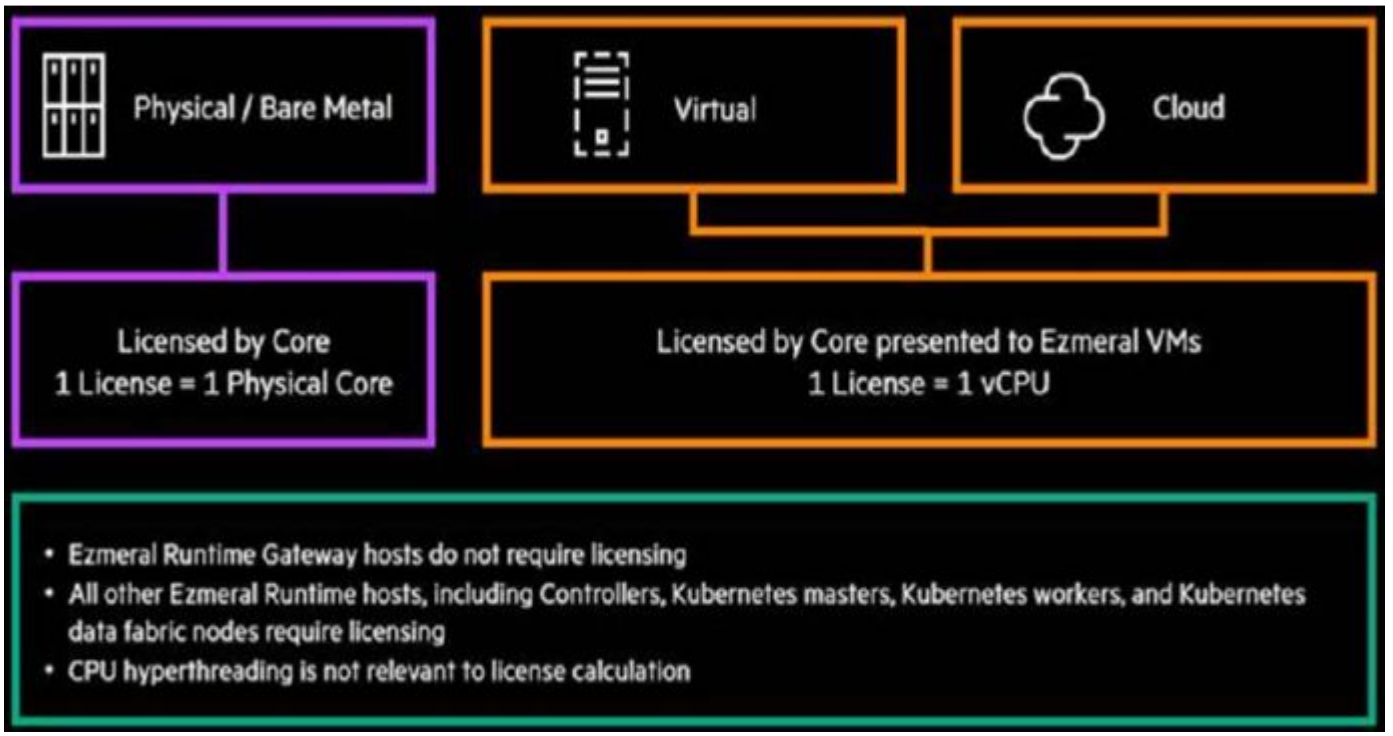
HPE ServicesHPE Tech Care Essentials Service

HPE ServicesHPE Tech Care Essentials Service is the operational service experience for HPE products. Tech Care goes beyond traditional support by providing access to product specific experts, an AI driven digital experience, and general technical guidance to not only reduce risk but constantly search for ways to do things better. HPE ServicesHPE Tech Care Essentials Service has been reimagined from the ground up to support a customer-centric, AI driven, and digitally enabled customer experience to move your business forward.

HPE Ezmeral products are covered by HPE ServicesHPE Tech Care Essentials, providing 24x7 global support coverage.

HPE Ezmeral Runtime Enterprise Customer Scenario

Configuration Information



Total Server CPU Cores	HPE Ezmeral Runtime Enterprise Minimum Subs	HPE Ezmeral Runtime Enterprise Maximum Subs (Comprehends additional 30% for Virtual CPU's)
16	16	20
20	20	24
24	24	32
28	28	36
32	32	40
36	36	44
40	40	52
44	44	56
48	48	62

Notes:

– The following end user information is required at time of order to receive the electronic license:

- End user organization name
- End user organization address
- End user contact name
- End user email address
- Reseller and distributor organization name and address (if applicable)

Summary of Changes

Date	Version History	Action	Description of Change
18-Nov-2024	Version 6	Changed	Overview, Standard Features and Configuration Information sections were updated.
07-Nov-2022	Version 5	Changed	Overview, Standard Features and Configuration Information sections were updated. Updated to reflect new changes in release 5.5
06-Sep-2022	Version 4	Changed	Overview and Standard Features sections were updated
15-Aug-2022	Version 3	Changed	Standard Features, Service and Support, and Configuration Information sections were updated.
01-Aug-2022	Version 2	Changed	Standard Features and Configuration Information sections were updated.
02-May-2022	Version 1	New	New QuickSpecs

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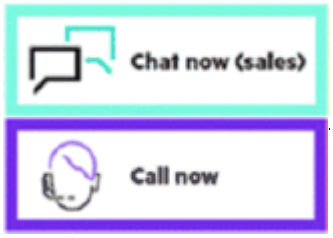

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