

Using HPE Containers
OFFICIAL CERTIFICATION STUDY GUIDE
(EXAM HPE2-N68)

First Edition

Miriam Allred

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Official Certification Study Guide (Exam HPE2-N68)
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About the technical reviewers

Iris Young, HPE Distinguished Technologist, and Paul Chin, Software Specialist, provided the technical review.

Introduction

This study guide is based on the Using HPE Containers, Rev. 21.11 course and helps you prepare for HPE Product Certified – Containers [2021] certification exam (HPE2-N68). The guide provides an in-depth introduction to the HPE Ezmeral Container Platform, including key concepts and benefits. It also covers practical tasks such as installation and setup.

Note: The Using HPE Ezmeral Container Platform – Self-Directed Lab also provides hands-on exercises to learn how to install, set up, and use the HPE Ezmeral Container Platform.

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It is assumed that you will have basic industry-standard knowledge and skills related to containers, and have some familiarity with the HPE product portfolio.

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CONTENTS

1	Container Foundations.....	1
	Assumed knowledge.....	1
	Container overview	1
	What is a container?.....	1
	Containers versus VMs	2
	Container benefits.....	3
	Containers for DevOps.....	4
	Some additional container use cases	6
	Key Docker concepts	10
	Docker hosts.....	10
	Comparing virtualized versus bare metal deployment	10
	Docker images, repositories, and registries	12
	Running an image on a Docker host.....	15
	How containers run.....	16
	How Docker containers connect to the network.....	17
	How Docker containers use storage.....	18
	Stateless versus stateful containerized applications.....	19
	Key Kubernetes concepts	20
	Why container orchestration.....	21
	Kubernetes: Open-source container orchestration	21
	Kubernetes pods	22
	Kubernetes architecture	23
	Kubernetes approach to orchestration.....	25
	Simplified example of Kubernetes orchestration.....	26
	YAML format	28
	Overview of remaining Kubernetes concepts	29
	Kubernetes networking: Requirements.....	30
	Kubernetes networking: Capabilities delivered by solutions	31
	Kubernetes networking: Canal	32
	Kubernetes services.....	33
	Kubernetes services: Port versus targetPort.....	34
	Kubernetes services: ClusterIP services	34
	Kubernetes services: NodePort services.....	36
	Kubernetes services: Need for load balancing for external services.....	36

Kubernetes configmaps and secrets	37
Kubernetes storage: Volumes	38
Kubernetes storage: Persistent Volumes (PVs).....	40
Kubernetes storage: How a container mounts a PV	41
Kubernetes storage: StorageClasses	43
Kubernetes storage: Container Storage Interface (CSI) driver.....	44
Ongoing challenges and requirements with containers.....	45
Summary.....	46
Learning checks	46
2 Introduction to HPE Ezmeral Container Platform	49
Assumed knowledge.....	49
Why HPE Ezmeral Container Platform	49
HPE Ezmeral Container Platform	50
Key HPE Ezmeral Container Platform use cases	50
Main HPE Ezmeral Container Platform components	52
Key value-adds beyond Kubernetes.....	53
Unified management of multi-cluster Kubernetes:	
Kubernetes services.....	55
Improved operations: Kubernetes services.....	56
Accelerated modernization for monolithic stateful apps: Kubernetes	
services and data management.....	57
Simpler application deployment: Application platform and	
infrastructure services	58
Improved security and visibility: Security and infrastructure services	59
Enhanced ML Ops: HPE Ezmeral ML Ops license.....	59
Why HPE Ezmeral Container Platform	60
HPE Ezmeral Container Platform versus homegrown Kubernetes	61
HPE Ezmeral Container Platform versus Kubernetes in the	
public cloud.....	62
HPE Ezmeral Container Platform versus engineered	
Kubernetes solutions.....	63
HPE Ezmeral Container Platform architecture and deployment options.....	64
HPE Ezmeral Container Platform control plane	64
Access to Kubernetes API through the Ezmeral	
Container Platform gateway	66
Access to Kubernetes services through the Ezmeral Container	
Platform gateway.....	66
HPE Ezmeral Container Platform logical architecture with EPIC	67
HPE Ezmeral Container Platform host and cluster types	68
HPE Ezmeral Container Platform deployment options	69

HPE Ezmeral Container Platform deployment options	71
How HPE Ezmeral Container Platform is licensed	73
HPE Ezmeral Container Platform multi-tenant design	75
HPE Ezmeral Container Platform tenants on Kubernetes clusters	75
Tenant design principles	76
HPE Ezmeral Container Platform Reference Architectures	
and Configurations	76
Physical infrastructure overview	77
RA for DevOps, CI/CD, app modernization, and hybrid cloud	78
RC for Big Data Analytics or AI/ML	79
RC for ML and IoT at Edge	80
Summary	81
Learning checks	82
3 Getting Started with HPE Ezmeral Container Platform	83
Assumed knowledge	83
Deployment planning	83
Network considerations: Two networks	84
Network considerations: Deploying HPE Ezmeral	
Container Platform on multiple subnets	85
Network requirements	86
Storage requirements	86
System requirements	87
High availability planning	87
Platform HA	88
Platform HA failover process	88
Planning for platform HA	89
Gateway HA	90
Installation	91
Installer bundles	92
Enable HTTPS access	93
Run the pre-check script	94
Pre-check config file or standard installation	95
Data Fabric choices	96
Complete the installation	97
Platform administration	99
Log in to the Web interface	99
User authentication	100
User roles	102
Assigning user roles	103

Enabling platform HA and configuring gateways and gateway HA	103
Enabling platform HA	104
Configuring gateways and gateway HA	105
Summary.....	106
Learning checks	106
4 HPE Ezmeral Data Fabric	107
Assumed knowledge.....	107
Introduction to HPE Ezmeral Data Fabric.....	107
HPE Ezmeral Data Fabric	108
HPE Ezmeral Data Fabric: XD Cloud-Scale Data Store	108
Ezmeral Data Fabric capabilities.....	110
HPE Ezmeral Data Fabric deployment options	110
Ezmeral Data Fabric options on Ezmeral Container Platform:	
Ezmeral Data Fabric on Kubernetes (separate storage and compute, recommended).....	113
Ezmeral Data Fabric options on Ezmeral Container Platform:	
Ezmeral Data Fabric on Kubernetes (co-located compute and storage, less recommended)	114
Ezmeral Data Fabric options on Ezmeral Container Platform:	
Multiple Data Fabric Kubernetes clusters	115
Ezmeral Data Fabric options on Ezmeral Container Platform:	
Embedded Data Fabric (non-production environments)	116
HPE Ezmeral Data Fabric concepts	117
Ezmeral Data Fabric namespace.....	117
Ezmeral Data-Fabric volumes.....	118
Data Fabric containers	119
Data Fabric storage pools.....	120
Data Fabric replication.....	120
Replication settings.....	121
Data Fabric CLDB	122
Ticket-based authentication to the Data Fabric.....	123
Key Ezmeral Data Fabric advantages	124
Introduction to using Ezmeral Data Fabric within Ezmeral Container Platform	126
Ezmeral Container Platform tenant storage	126
Ways to specify Ezmeral Data Fabric for tenant storage.....	127
Ezmeral Data Fabric-based tenant storage.....	128
Access methods to Ezmeral Data Fabric-based tenant storage	129
FS mounts	130

DataTaps.....	131
Additional DataTaps into the Ezmeral Data Fabric.....	132
Using Ezmeral Data Fabric for Persistent Storage.....	133
Introduction to Ezmeral Data Fabric Administration.....	135
Administration tasks and methods of access.....	135
Accessing the MapR Control System (MCS) interface.....	138
Introduction to the MCS interface.....	138
Viewing and editing volumes.....	139
Issuing tickets.....	140
Summary.....	141
Learning checks.....	142
5 Managing Kubernetes with HPE Ezmeral Container Platform.....	143
Assumed knowledge.....	143
Review of Kubernetes Architecture in HPE Ezmeral Container Platform.....	144
Managing Kubernetes clusters within HPE Ezmeral Container Platform.....	144
Internal Kubernetes host and cluster types.....	145
HPE Ezmeral Container Platform Kubernetes host tags.....	146
Deploying an internal Kubernetes cluster.....	147
Overview of cluster creation process.....	147
Set up air gap: Private registry/repo setup.....	148
Set up air gap: Air-gap settings on HPE Ezmeral Container Platform.....	156
Set up hosts to meet requirements.....	157
Set up hosts to meet storage requirements.....	159
Set up hosts to accept installation: SSH access.....	161
Set up hosts to accept installation: Agent-based.....	163
Add Kubernetes hosts.....	170
Select and add hosts.....	170
Select disks (no Persistent Storage).....	171
Select disks (Persistent Storage).....	173
Enter lockdown and install.....	175
Validate the host installation.....	175
Troubleshoot the installation.....	176
Create the cluster.....	177
Select hosts and assign roles.....	178
Select hosts and assign roles: Understand HA.....	181

Configure cluster settings	181
Configure cluster authentication	183
Choose cluster services	183
Validate and initiate	184
Troubleshooting	185
Register a Data Fabric cluster as tenant storage	186
Importing an external Kubernetes cluster	188
Overview of the cluster import process	188
Establish the external cluster	188
Gather necessary information	190
Import the cluster in Ezmeral Container Platform	191
Starting to manage the cluster	193
Configure Kubernetes tenant general settings	193
Configure Kubernetes tenant quotas: Understanding Kubernetes resources	195
Configure Kubernetes tenant quotas: Understanding Kubernetes requests and limits	196
Configure Kubernetes tenant quotas: Understanding Kubernetes tenant quotas	197
Configure Kubernetes tenant quotas: Planning Kubernetes tenant quotas	198
Manage Kubernetes users	200
Adding internal users	201
Assigning roles to internal users	202
Using external users	202
Viewing automatically added external users	204
Managing the Cluster as a Site Admin or Kubernetes Cluster Admin	204
Edit, shrink, and expand clusters	204
Access native Kubernetes management tools: Kubernetes Dashboard	206
Access native Kubernetes management tools: kubectl	207
Quick look at kubectl commands	209
Understand external cluster management	211
Summary	211
Learning checks	212
6 Deploying Kubernetes Applications on HPE Ezmeral Container Platform	213
Assumed knowledge	213
Introduction	214
Introduction to the Kubernetes Tenant User Interface (UI)	214

Options for running applications in the Tenant UI	215
Enabling the Web Terminal	216
Load YAML and other files in FS mount	217
Running applications with deployment objects	218
Example YAML file for a deployment object	218
Example file that selects node based on tag	221
Applying the file using the Kubectl tab	222
Applying the file in the Web Terminal and viewing the result	224
Adding services	224
Adding a service with a YAML file	225
Defining a ClusterIP service	226
Defining a NodePort service	226
Viewing and accessing a NodePort service (no gateway)	227
Providing gateway access for a service	229
Load balancing with the HPE Ezmeral Container Platform gateway	230
Viewing and accessing service endpoints (gateway)	232
Deploying applications with Helm	232
Using Helm	232
Helm components	233
Using Helm in Ezmeral Container Platform Web Terminal	235
Deploying applications with KubeDirector	238
Why KubeDirector	238
KubeDirector apps and clusters	239
Key components of a KubeDirector application: Roles	240
Key components of a KubeDirector application: Persistent directories	241
Key components of a KubeDirector application: Events	242
Key components of a KubeDirector application: Config package	243
Adding KubeDirector applications to Ezmeral Container Platform	244
Deploying KubeDirector applications in Ezmeral Container Platform	245
Viewing KubeDirector applications in Ezmeral Container Platform	246
Updating a KubeDirector cluster in HPE Ezmeral Container Platform	247
Using KubeDirector on an air-gapped cluster	248
Using DataTaps with big data applications	249
Review DataTaps	249

Hadoop and HDFS.....	249
Hadoop architecture on HPE Ezmeral Container Platform	250
Creating and referencing DataTaps	251
Using DataTaps in apps on Ezmeral Container Platform: Specify the DataTap within the Kubernetes object	252
Using DataTaps in apps on Ezmeral Container Platform: Configure the application to use the DataTap	256
Using FS Mounts and PVs	257
Using FS Mounts in pods	257
Provisioning dynamic PVs on Ezmeral Data Fabric	258
Using Apache Spark on HPE Ezmeral Container Platform.....	261
Apache Spark	261
Spark-submit	262
Apache Spark Cluster Manager options.....	263
Enabling Spark Operator on an Ezmeral Container Platform Kubernetes cluster	264
Changes implemented by Spark Operator	265
Running a Spark application with the Spark Operator: Spark application object.....	266
Running a Spark application with the Spark Operator: Location options.....	267
Running a Spark application with the Spark Operator: DataTap option	269
Running a Spark application with the Spark Operator: Process	269
Deploying a standalone Spark cluster on HPE Ezmeral Container Platform	270
Running a job on a standalone Spark cluster on HPE Ezmeral Container Platform	271
Using Istio with HPE Ezmeral Container Platform.....	273
Why Istio and why Istio on HPE Ezmeral Container Platform.....	273
Istio architecture.....	274
Enabling Istio on HPE Ezmeral Container Platform	275
Add an Istio Gateway host to the cluster	276
Enabling Istio on the Kubernetes cluster	277
Enabling Istio service mesh on the Kubernetes tenant	278
Istio service registry.....	279
Istio virtual services and destination rules	279
Istio virtual services with ingress gateway.....	285
Viewing Virtual Endpoints	288
Accessing the Kiali Dashboard.....	288

Some tasks available in the Kiali Dashboard	288
Summary.....	289
Learning checks	290
7 Implementing ML Ops on an HPE Ezmeral Container	
Platform Kubernetes Cluster.....	291
Assumed knowledge.....	291
Introduction to ML Ops	292
What are Machine Learning (ML) and Deep Learning (DL)	292
ML lifecycle	293
Simplified example of the ML lifecycle: Data prep	294
Simplified example of the ML lifecycle: Build	295
Simplified example of the ML lifecycle: Supervised training	296
Simplified example of the ML lifecycle: Unsupervised training.....	297
Simplified example of the ML lifecycle: Models and scoring.....	298
Simplified example of the ML lifecycle: Deployment	299
Simplified example of the ML lifecycle: Monitoring.....	299
Some common applications in the ML lifecycle	300
Challenges in navigating the ML application lifecycle.....	303
How HPE Ezmeral ML Ops addresses these challenges.....	304
Why HPE Ezmeral ML Ops: Shared platform services	305
Why HPE Ezmeral ML Ops: Shared cluster services	305
Why HPE Ezmeral ML Ops: Shared tenant services	306
Why HPE Ezmeral ML Ops: ISV integration.....	307
Implementing ML projects on HPE Ezmeral Container Platform.....	307
High-level process for running ML projects in HPE Ezmeral	
Container Platform	308
Site Admin: Check licensing.....	308
Site Admin: Prepare the cluster and tenant storage	309
Site Admin: Create the AI/ML project (tenant)	311
Introduction to the AI/ML Project UI.....	312
Project Admin: Manage the project repository.....	313
Project Admin: Set up the Global Source Control.....	315
Project Member: Pieces of a project.....	316
Project Member: Configure individual source control	317
Understanding the training application	318
Project Member: Launching a Training Cluster	319
Project Member: View Training Cluster Endpoints	320
Understanding the Notebook application.....	320
Project Member: Understanding Notebook cluster connections.....	321

Project Member: Collect secrets	322
Project Member: Launching Jupyter Notebook	323
Project Member: Access the Notebook server	324
Project Member: Use Ezmeral ML Ops magic commands in a Notebook	325
Project Member: Register the model.....	327
Project Member: Use Ezmeral ML Ops magic commands in a Notebook to update model registration	328
Understanding the deployment application	329
Project Member: Deploy a Deployment Cluster	330
Sending calls to the model	331
Setting Up Kubeflow on HPE Ezmeral Container Platform	332
Kubeflow overview.....	332
Kubeflow pipelines.....	333
Kubeflow authentication architecture	335
Preparing to install Kubeflow on Ezmeral Container Platform: Cluster requirements.....	336
Preparing to install Kubeflow on Ezmeral Container Platform: Storage requirements	337
Air-gap environments only: Add Kubeflow images to the private registry	338
Install Kubeflow	339
Result of Kubeflow installation	343
Final checks and patches	346
Kubeflow user profiles (namespaces)	349
Project member: Accessing the Kubeflow Dashboard	350
Summary.....	351
Learning checks	352
8 Deploying Big Data or AI/ML Workloads on HPE EPIC Hosts	353
Assumed knowledge.....	353
Using EPIC hosts	354
Workloads and tenants	354
Key EPIC concepts.....	354
Overview of using EPIC.....	355
Site Admin: Add hosts.....	356
Site Admin: Install apps from App Store	358
Site Admin: Set up the tenants.....	359
Site Admin: Specify additional tenant options.....	360
Site Admin: Managing EPIC tenant users	361

Site Admin: Set up persistent storage.....	362
Tenant Admin: Set up flavors.....	363
Tenant Admin: Set up FS mounts and DataTaps	363
Tenant Member: Create a virtual cluster	364
Tenant Member: Manage virtual clusters	365
Tenant Member: Use templates.....	365
AI/ML projects on EPIC	366
Summary.....	367
Learning checks	368
9 Day 2 Operations on HPE Ezmeral Container Platform	369
Assumed knowledge.....	369
Monitoring with Ezmeral Container Platform	370
Monitoring benefits	370
Elastic Stack	371
Elasticsearch.....	372
Elastic Stack architecture on Ezmeral Container Platform.....	372
Ezmeral Container Platform dashboards	374
Viewing logs	377
Elasticsearch query tips	378
Using Kibana.....	380
Enabling Kibana on Ezmeral Container Platform	380
Planning Kibana visualizations and dashboards.....	381
Process for creating a Kibana dashboard	382
Creating index patterns	382
Creating visualizations	384
Visualization buckets.....	385
Visualization metrics	387
Creating a dashboard.....	389
Sharing and exporting dashboards and other objects	390
Using Nagios alerts.....	392
Nagios overview	392
Viewing status and alerts.....	393
Setting up SNMP and SMTP alerts.....	396
Using the Nagios container to edit contacts.....	398
Maintaining the Ezmeral Container Platform	400
Types of upgrades.....	400
Understanding the impact of a platform upgrade	401
Prepare for the upgrade	402
Upgrade the Ezmeral Container Platform software.....	404

Upgrade Kubernetes software on Kubernetes clusters.....	405
Summary.....	407
Learning checks	407
10 Practice Exam	409
Introduction	409
Minimum qualifications.....	409
Exam details	409
Testing objectives.....	410
Advice to help you take the HPE2-N68 exam	411
Practice Test.....	411
Appendix: Answers to Learning Checks	433
Chapter 1	433
Chapter 2.....	433
Chapter 3.....	434
Chapter 4.....	435
Chapter 5.....	435
Chapter 6.....	437
Chapter 7.....	437
Chapter 8.....	438
Chapter 9.....	439
Index.....	441

1 Container Foundations

EXAM OBJECTIVES

- ✓ Define containers and explain how they work.
 - ✓ Describe container use cases.
 - ✓ Explain the need for container orchestration.
-

Assumed knowledge

- Basic understanding of virtual machines (VMs)
- Basic understanding of data center servers and storage

Container overview

The chapter provides a brief overview of container technologies with an emphasis on Docker containers. It then explains why companies need container orchestration solutions to run containerized applications at scale and introduces a de-facto standard open-source solution, Kubernetes.

You will begin by learning about containers and why companies are embracing this technology.

What is a container?

Containers are designed to make it easier to move applications from one server to another without the risk of missing dependencies causing issues.

Traditionally, moving an application from one system to another could lead to major problems. To understand why, you need to understand a little bit about an application's "runtime system" and why any changes to that system can cause problems. The runtime system is the environment in which an application runs. It includes the binaries that translate human readable code to machine code for execution. The runtime system also includes libraries, which are common pieces of code that multiple applications can call on and run. For example, python has a math library with many mathematical functions already defined within it so that every developer does not have to recreate these functions. Most modern applications use dynamic libraries, which are linked to the code when it is compiled (if the application uses a compiled language), but only have their code loaded into the application when the application starts to run.

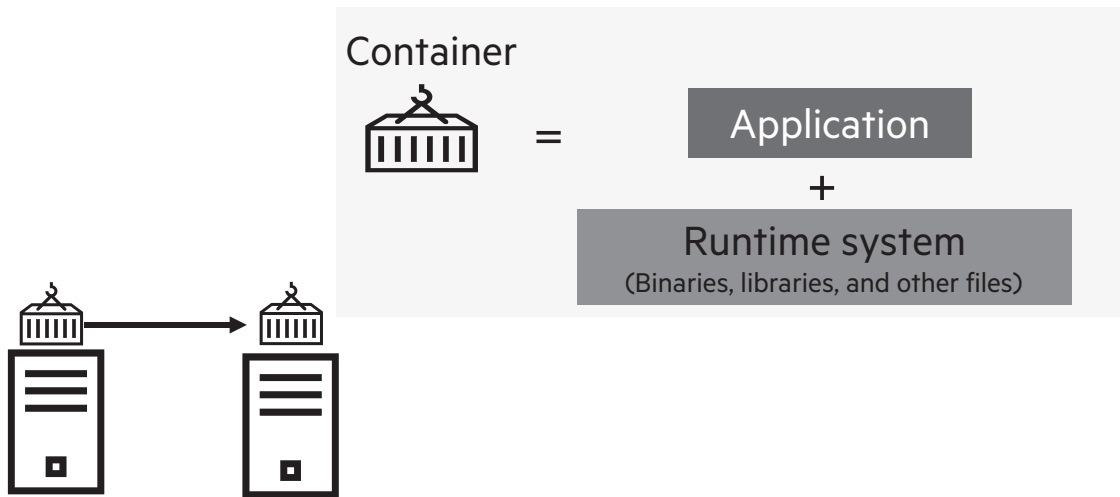


Figure 1-1: What is a container?

As developers create an application, they set up the runtime system with all the binaries and libraries that the application needs. Now imagine that the code moves from one server to another—for example, from a server in the development environment to a server in the production environment. If the new server’s runtime system does not exactly mirror the development one, the application might link to a dynamic library that does not exist—causing it to fail to compile or run.

As shown in Figure 1-1, a container combines an application with its runtime system so that the application always has the correct binaries and libraries to run successfully.

Containers versus VMs

Another key characteristic of containers is that they isolate the application processes. Multiple containers can run on the same host in isolation. You are probably familiar with virtual machines (VMs), another technology that enables a logical division of resources on a host. It can be useful to look at how a container compares with a VM.

As shown in Figure 1-2, both VMs and containers allow a single physical server to support multiple isolated applications, each with its own runtime systems. However, each VM has its own full OS while all containers on a host share an OS. VMs are deployed over a hypervisor while containers are deployed over an OS and a container runtime platform. The most common container runtime is Docker, which will be the focus of this study guide. (Other container platforms exist, including containerd, runc, and cri-o.)

Neither the VM nor the container architecture is better per se, but each is optimized for particular use cases.

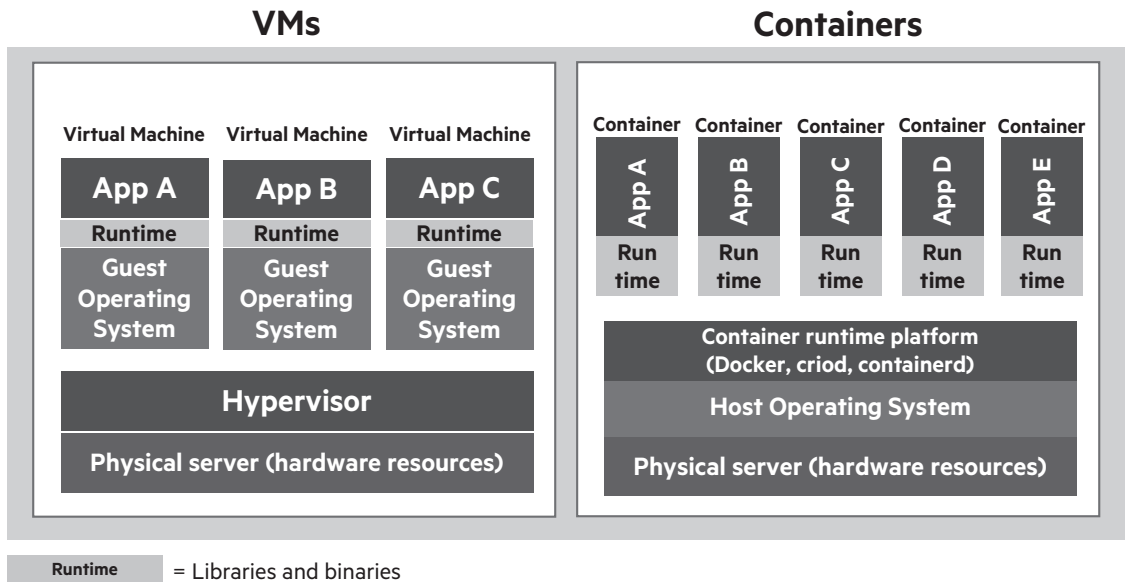


Figure 1-2: Containers versus VMs

Container benefits

As shown in Figure 1-3, containers provide a number of benefits. For example, containers can offer greater portability for applications from one environment to another. Although you can move a live virtual machine (VM), state and all, from one host to another using technologies such as VMware vMotion, these technologies can be complex and limited in scope. (For example, the VM might only be able to move to another host in the same segment of the data center.) Containers, on the other hand, do not truly move. You simply stop a container on one host and start it on any other host running the same container platform. Because the application carries its runtime system with it, it runs on the new host exactly as it did on the previous host without the risk of missing dependencies causing issues. (Note, though, the restarting container does not take its state with it; later in this study guide, you will learn how HPE Ezmeral Container Platform helps to fill in such gaps and enable support for stateful apps.)