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

First Edition

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About the author

Miriam Allred has spent the last 16 years configuring, testing, and troubleshooting HP and HPE solutions. She combines this wide range of technical expertise with pedagogy and instructional design training, allowing her to create entry-level to advanced technical training for server, storage, and networking professionals. She has a Master's degree from Cleveland State University and a Bachelor's degree from Brigham Young University.

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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Audience

HPE customers, partners, and employees who configure, implement, support, and use HPE Ezmeral Container Platform solutions.

Assumed knowledge

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.

Minimum qualifications

Typical candidates for this certification are HPE customers, partners, and employees who configure, implement, support, and use HPE Ezmeral Container Platform solutions.

Relevant certifications

After you pass this exam, your achievement may be applicable toward more than one certification. To determine which certifications can be credited with this achievement, log in to The Learning Center and view the certifications listed on the exam's More Details tab. You might be on your way to achieving additional certifications.

Preparing for Exam HPE2-N68

This self-study guide does not guarantee that you will have all the knowledge you need to pass the exam. It is expected that you will also draw on real-world experience and would benefit from completing the hands-on lab activities provided in the instructor-led training. HPE also provides a self-directed lab environment to which you can purchase access for a three-day period.

Recommended HPE training

Recommended training to prepare for each exam is accessible from the exam's page in The Learning Center. See the exam attachment, "Supporting courses," to view and register for the courses.

Obtain hands-on experience

You are not required to take the recommended, supported courses, and completion of training does not guarantee that you will pass the exams. Hewlett Packard Enterprise strongly recommends a combination of training, thorough review of courseware and additional study references, and sufficient on-the-job experience prior to taking an exam.

Exam registration

To register for an exam, go to https://certification-learning.hpe.com/tr/learn_more_about_exams.html

CONTENTS

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.

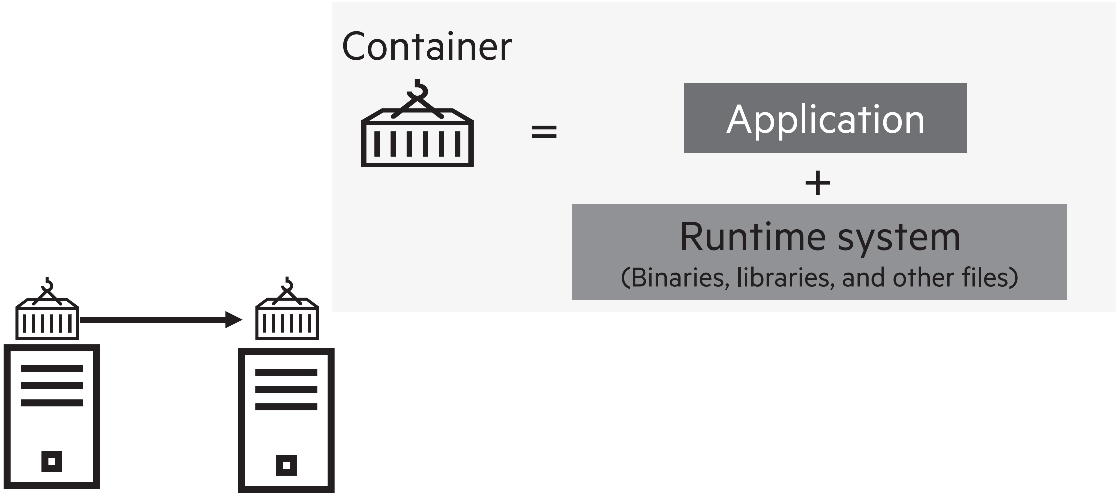

Figure 1-1: What is a container?

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.

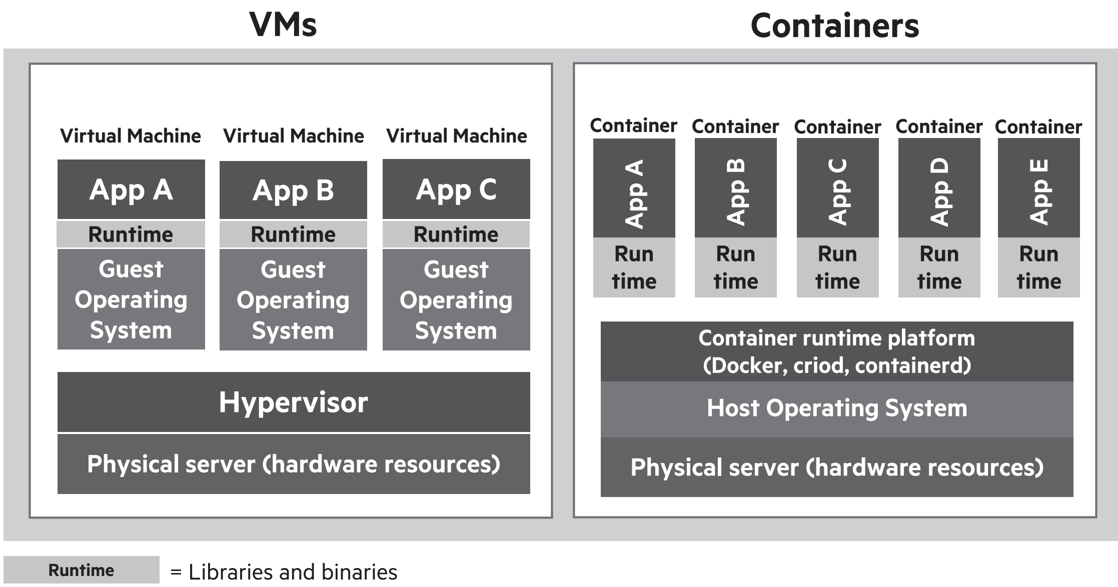

Figure 1-2: Containers versus VMs

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.)