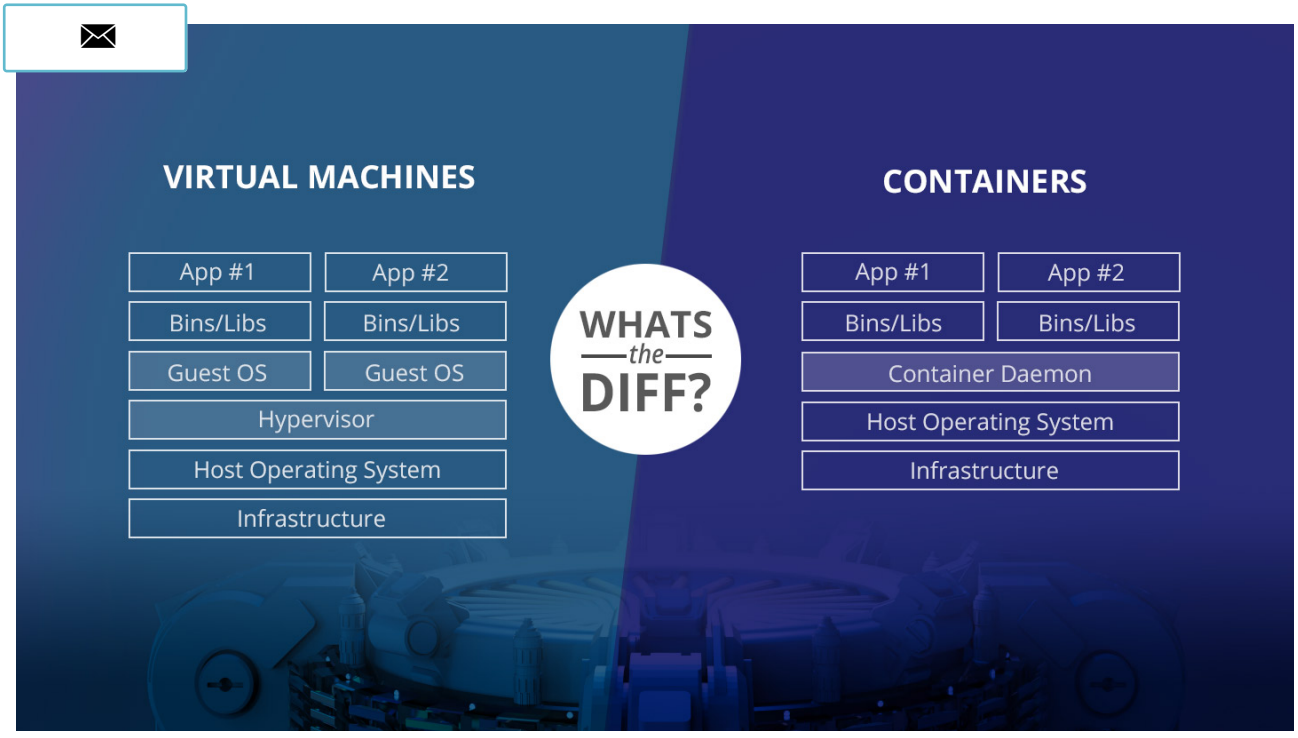
's the Diff: VMs vs Containers

Bauer | June 28th, 2018



hardware and software resources. Containers are the new kids on the block, but VMs have been, and continue to be, tremendously popular in data centers of all sizes.

If you're looking for the best solution for running your own services in the cloud, you need to understand these virtualization technologies, how they compare to each other, and what are the best uses for each. Here's our quick introduction.

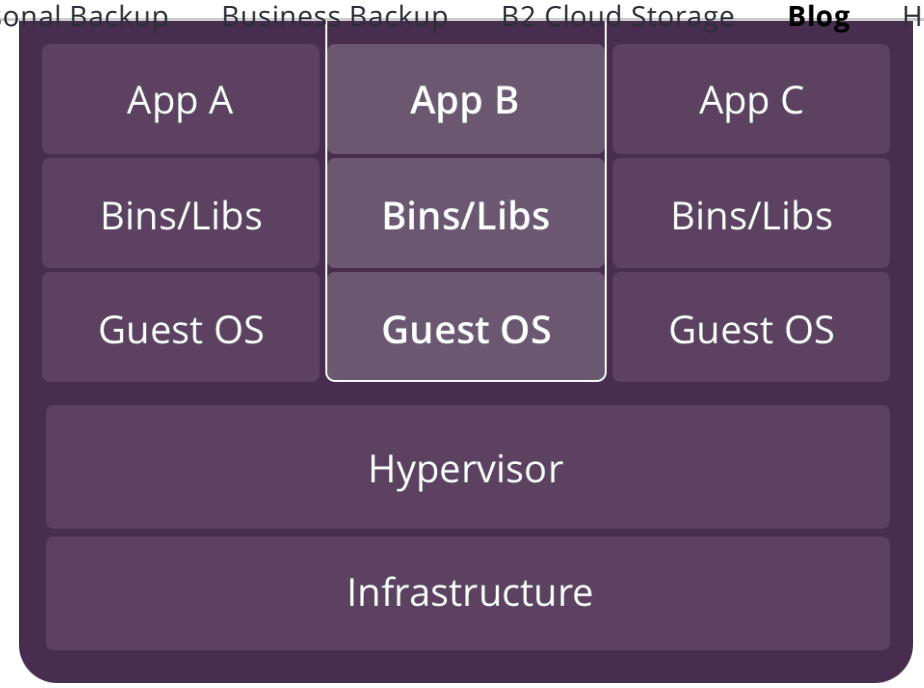
Basic Definitions — VMs and Containers

What are VMs?

A virtual machine (VM) is an emulation of a computer system. Put simply, it makes it possible to run what appear to be many separate computers on hardware that is actually one computer.

The operating systems ("OS") and their applications share hardware resources from a single host server, or from a pool of host servers. Each VM requires its own underlying OS, and the hardware is virtualized. A hypervisor, or a virtual machine monitor, is software, firmware, or hardware that creates and runs VMs. It sits between the hardware and the virtual machine and is necessary to virtualize the server.

Since the advent of affordable virtualization technology and cloud computing services, IT departments large and small have embraced virtual machines (VMs) as a way to lower costs and increase efficiencies.



VMs, however, can take up a lot of system resources. Each VM runs not just a full copy of an operating system, but a virtual copy of all the hardware that the system needs to run. This quickly adds up to a lot of RAM and CPU t's still economical compared to running separate actual computers, but for some applications it can be overkill.

That led to the development of containers.

Benefits of VMs

- All OS resources available to apps
- Established management tools
- Established security tools
- Better known security controls

Popular VM Providers

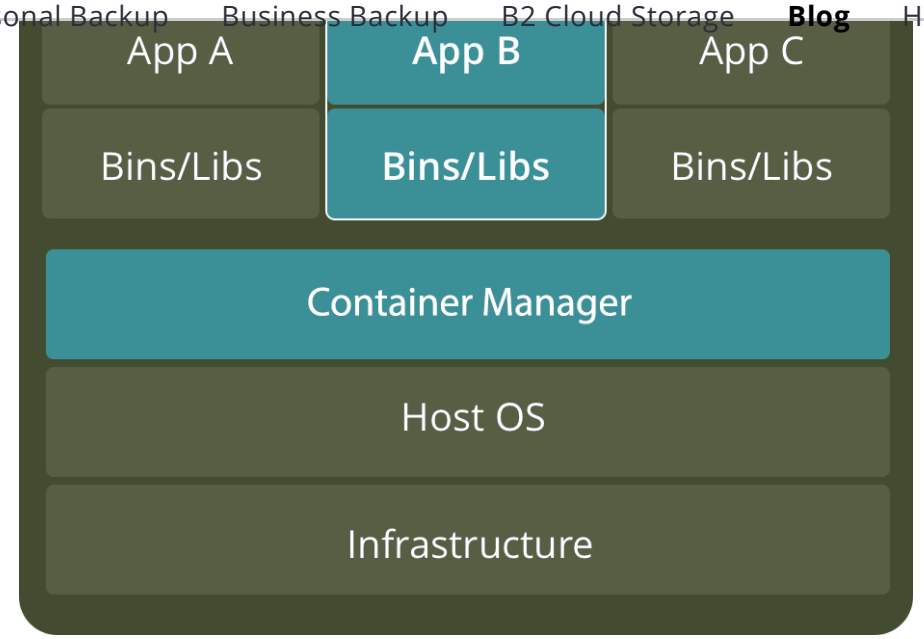
- Xen
- Hyper-V
- KVM

What are Containers?

With containers, instead of virtualizing the underlying computer like a virtual machine (VM), just the OS is virtualized.

; sit on top of a physical server and its host OS — typically Linux or Each container shares the host OS kernel and, usually, the binaries es, too. Shared components are read-only. Sharing OS resources such as libraries significantly reduces the need to reproduce the operating system code, and means that a server can run multiple workloads with a single system installation. Containers are thus exceptionally "light" — they egabytes in size and take just seconds to start. In contrast, VMs take minutes to run and are an order of magnitude larger than an equivalent container.

In contrast to VMs, all that a container requires is enough of an operating system, supporting programs and libraries, and system resources to run a specific program. What this means in practice is you can put two to three times as many as applications on a single server with containers than you can with a VM. In addition, with containers you can create a portable, consistent operating environment for development, testing, and deployment.



Containers

tainers (LXC) — The original Linux container technology is Linux , commonly known as LXC. LXC is a Linux operating system level on method for running multiple isolated Linux systems on a single host.

Docker — Docker started as a project to build single-application LXC containers, introducing several changes to LXC that make containers more portable and flexible to use. It later morphed into its own container runtime environment. At a high level, Docker is a Linux utility that can efficiently create, ship, and run containers.

Benefits of Containers

- Reduced IT management resources

- Reduced & simplified security updates
- Less code to transfer, migrate, upload workloads

Popular Container Providers

- Linux Containers
  - LXC
  - LXD
  - CGManager
  - er
  - ows Server Containers

Uses for VMs vs Uses for Containers

Both containers and VMs have benefits and drawbacks, and the ultimate decision will depend on your specific needs, but there are some general rules of thumb:

- VMs are a better choice for running apps that require all of the operating system's resources and functionality, when you need to run multiple applications on servers, or have a wide variety of operating systems to manage.
- Containers are a better choice when your biggest priority is maximizing the number of applications running on a minimal number of servers.

What's the Diff: VMs vs. Containers

Limited performance	Native performance
Each VM runs in its own OS	All containers share the host OS
Hardware-level virtualization	OS virtualization
Startup time in minutes	Startup time in milliseconds
Allocates required memory	Requires less memory space
Fully isolated and hence more secure	Process-level isolation and hence less secure

he ideal setup is likely to include both. With the current state of
on technology, the flexibility of VMs and the minimal resource
requirements of containers work together to provide environments with
maximum functionality.

anization is running a large number of instances of the same
operating system, then you should look into whether containers are a good fit.
They just might save you significant time and money over VMs.

Are you Using VMs, Containers, or Both?

We will explore this topic in greater depth in subsequent posts. If you are using VMs or containers, we'd love to hear from you about what you're using and how you're using them.

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Packard, Cisco, the Pentagon, and the White House. In 2016 he was a Ford-Mozilla Fellow with Common Cause in Washington, D.C., where he advocated for a free, open, and accessible internet for all, slowing media consolidation, and transparency in politics and the media.

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Jay T • 16 hours ago

@Roderick Bauer I'm curious as to what Backblaze uses? Are your storage pods native, or do they run a hypervisor with the OS on top? What about your web instances?

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Roderick Bauer Mod Jay T • 15 hours ago

The short answer is they're bare metal running Debian. You can find more info here: https://www.backblaze.com/p...

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Whistler • 21 hours ago

r point about "Host OS and container OS are the same" about containers is not accurate. You can run docker on Windows and pull in linux containers. ://www.deploycontainers... Furthermore, you can run something like vmware Photon with docker and run containers with all kinds of different flavors of linux.

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Roderick Bauer Mod Nate Whistler • 20 hours ago

Thanks for the note.

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