Red Hat Summit

Connect

Operating System as a Container

Image mode for RHEL

Red Hat
Enterprise Linux 10

Speaker introduction

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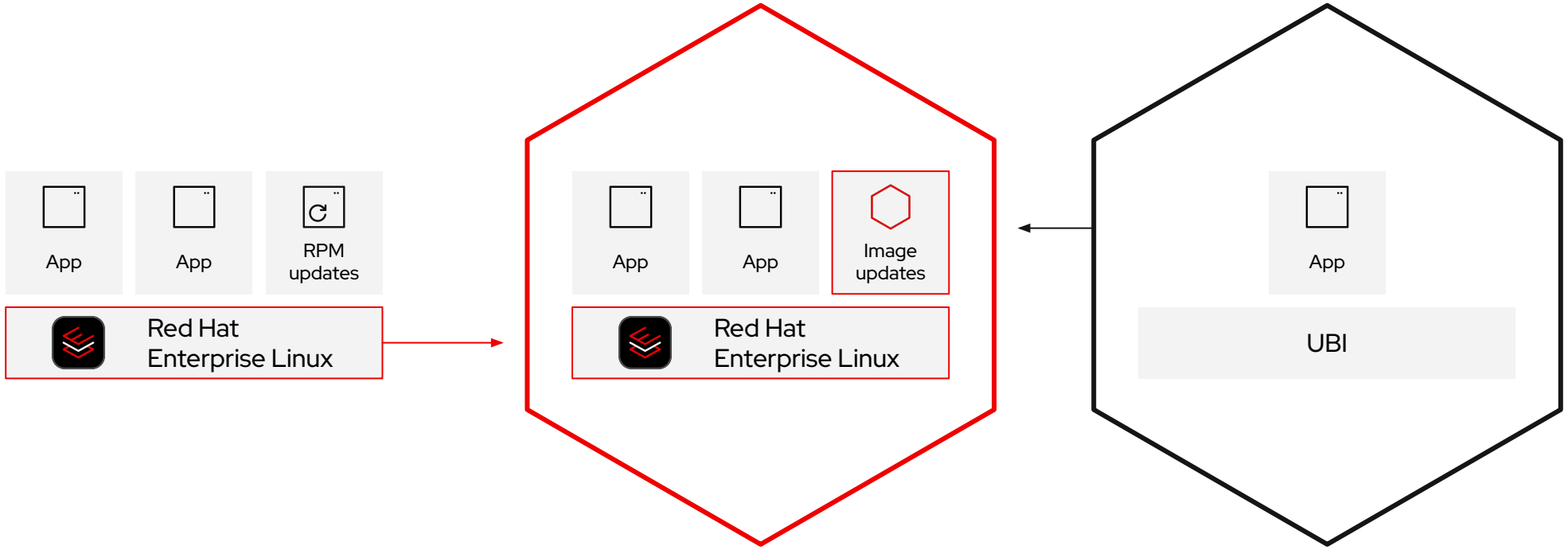
Infrastructure & organizational complexity

is still a problem...

Common challenges that involve the OS

- Different platforms require different tools, teams and expertise
- Testing and validation are time consuming
- Application support matrix
- No one budgets for maintenance and upgrades
- Negotiating between stakeholders
- Drift between images, instances, and runtime
- Immutable aspirations vs. mutable realities
- Image inventory, versioning, and pruning
- Let’s not forget security!

Standardizing and innovating with containers



Package mode

Image mode

Application container

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Standardizing and innovating with containers

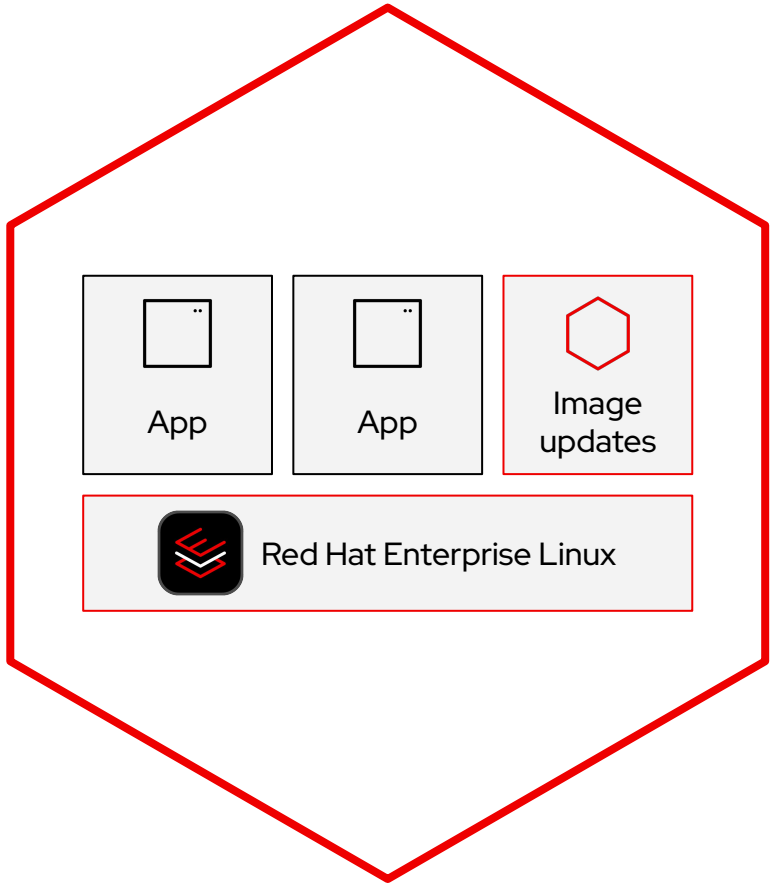

Image mode for Red Hat Enterprise Linux is a simple, consistent approach to build, deploy and manage the operating system using container technologies.

Now you can manage the operating system with the same tools and workflows as applications, promoting a common experience and language across teams.

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Image mode for Red Hat Enterprise Linux

A container-native workflow for the life cycle of a system

```
FROM rhel10/rhel-bootc:latest

RUN dnf install -y [software]
[dependencies] && dnf clean
all

ADD [application]
ADD [configuration files]

RUN [config scripts]
```

Build

Define your entire system—OS, applications, and dependencies —with just a bootc base image and Containerfile. Leverage your existing container tools and pipelines for rapid image creation and testing.

Deploy

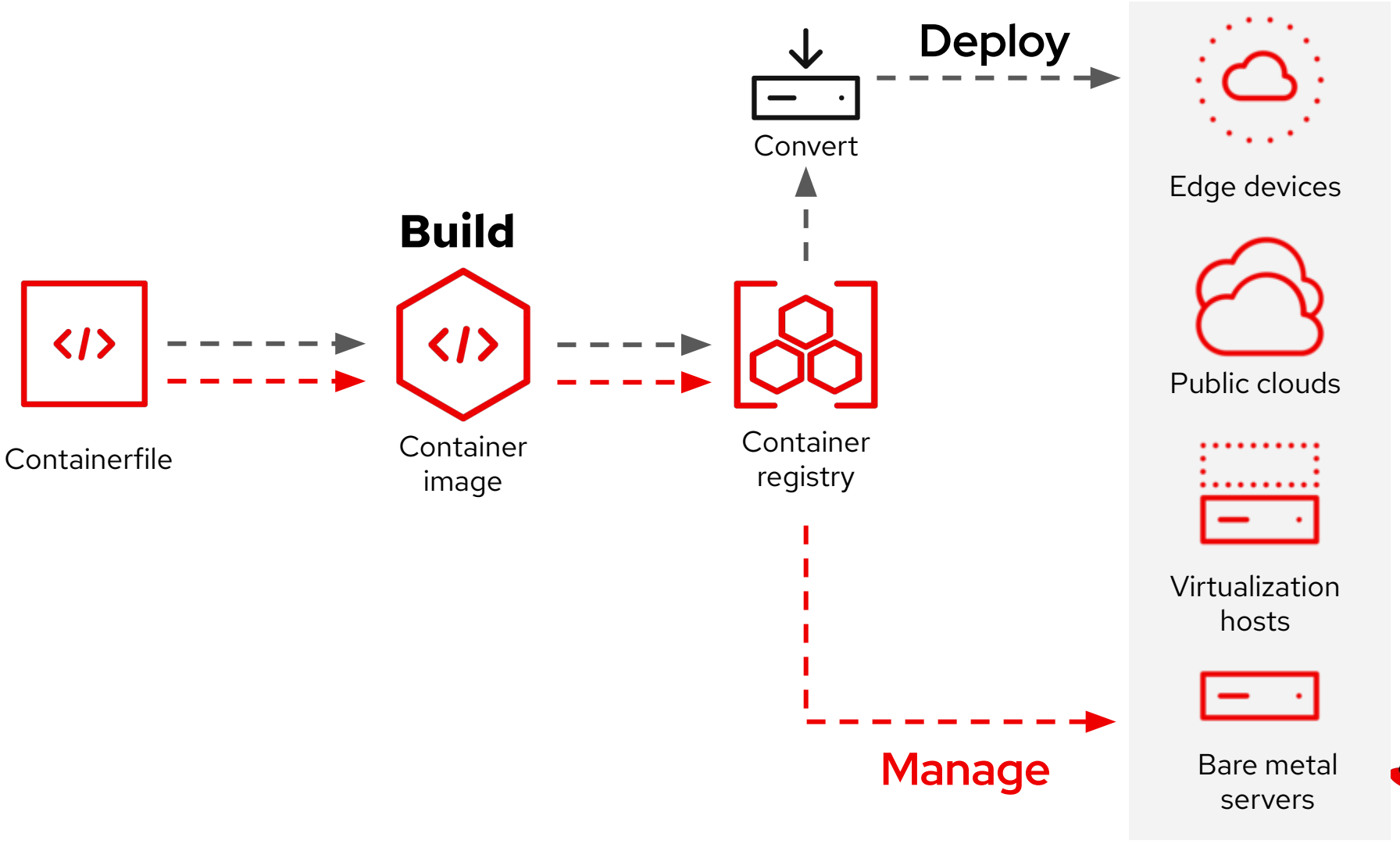
Easily convert to VM/cloud images, deploy on bare metal via the Red Hat Enterprise Linux installer, or even reinstall on existing cloud images using bootc.

Manage

Engineered for modern GitOps and CI/CD workflows. Fully drive and automate systems via pipelines or scale control through Red Hat Insights, Satellite, and Ansible.

Image mode for Red Hat Enterprise Linux

Simple. Consistent. Anywhere.



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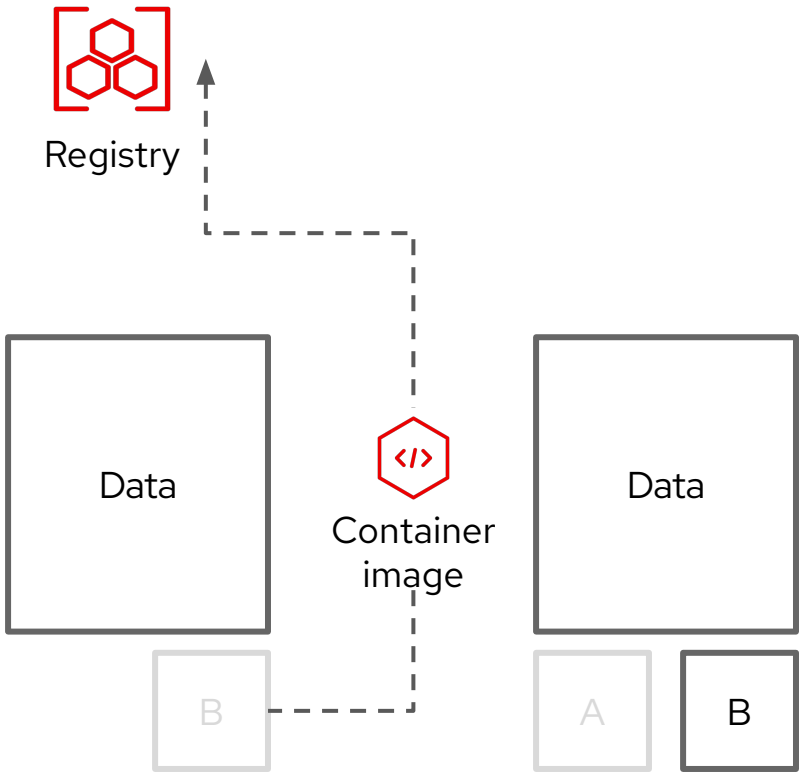
Bootc: Image-based updates perfected

Immutable by default - secure by design



Transactional updates (A → B model)

Bootc uses composefs and ostree to convert the container image into the root filesystem on the host.

Roll forward or backwards

Updates are staged in the background and applied when the system reboots. The transactional model enables rollbacks for additional assurance

Upgrades have never been easier

While there are some limits, bootc enables moving between minor releases of RHEL (9.5 → 9.6), as well as major releases (9.6 → 10.0)

Install via Kickstart

Deploy container images to bare metal using installation media

```
lang en_US.UTF-8
keyboard us
timezone Etc/UTC --isUtc
text
zerombr
clearpart --all --initlabel
autopart
reboot
user --name=admin-user --groups=wheel
sshkey --username=admin-user "ssh-rsa
AAAAB3Nza......"

NEW ostreecontainer --url quay.io/myimage:latest
```

Use existing provisioning workflows

- Red Hat Enterprise Linux boot media (isos)
- PXE & HTTP Boot for network based deployments

Kickstart and Anaconda are used for disk layout and select configurations

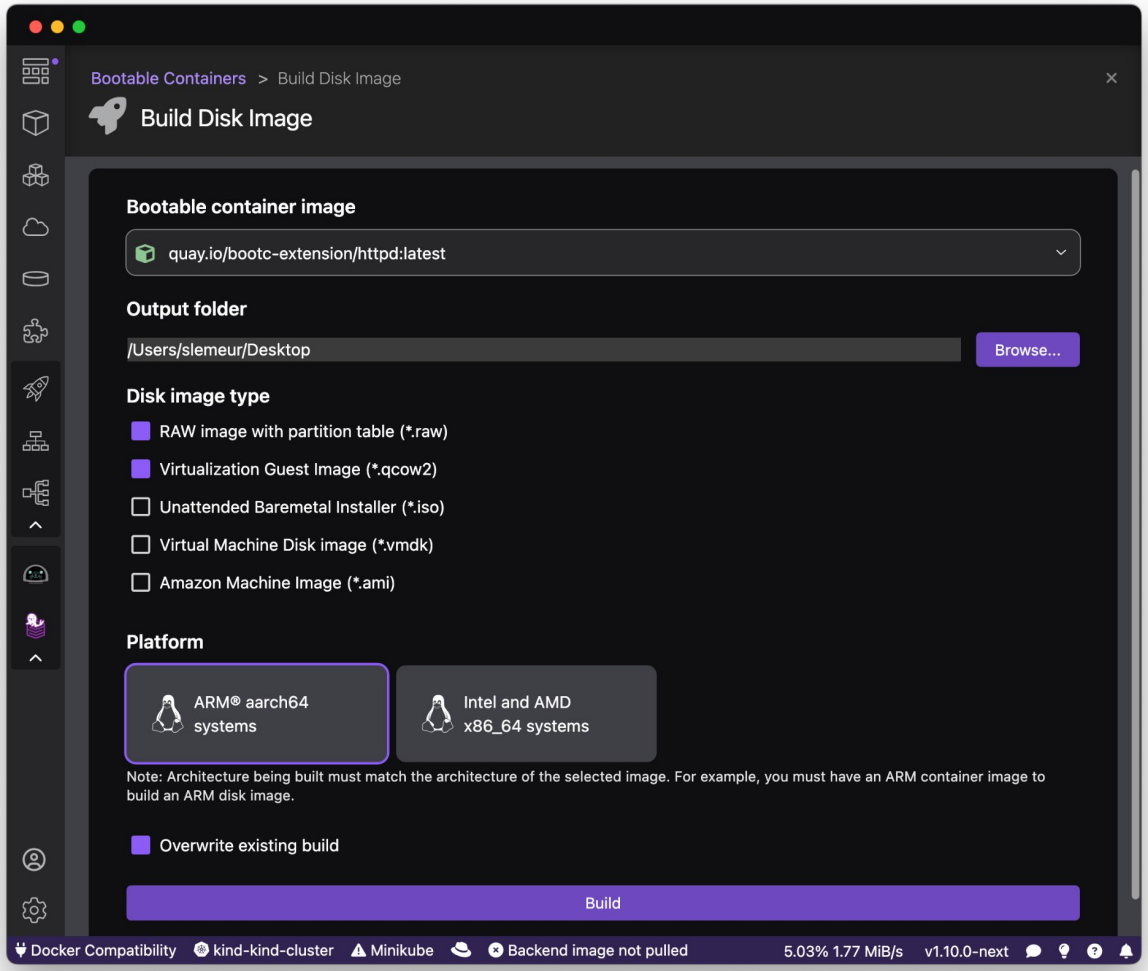
- `%packages` is ignored
- ostreecontainer will fetch the container image from a registry and write it to disk.

`%pre` and `%post` used for configuration

Bootc image builder

Create **bootable container images** for bare metal to AWS and everywhere in between

`qcow2`	QEMU Disk Images
`ami`	Amazon/Azure Machine Images
`raw`	Raw disk image with MBR or GPT partition table
`anaconda-iso`	Unattended installation (USB Sticks / Install-on-boot)
`vmdk`	Virtual Machine Disk Image (vSphere, etc.)



- Designed for and only available as a container image:
  - registry.redhat.io/rhel10/bootc-image-builder
- Available extension for Podman Desktop
  - Build for Intel & Arm architectures

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Outcomes

What does image mode solve today?

Less risk

Reduce the risk associated with updates with atomic transactions and rollbacks

Better builds

Improve the composability and repeatability of standard builds through layering

Move faster

Increase the speed of experimentation

Streamline process

Simplify end to end management with a single process for OS and applications

Use Cases

Where does image mode fit today?

AI/ML Stacks

Perfectly version app dependencies from kernel, GPU & accelerator drivers, frameworks, runtimes, etc

1:1 App/Host

Manage the OS AND app as a single unit

Edge appliances

Easily manage a fleet of systems with registries and auto-updates

Standalone container hosts

Use common toolchains and pipelines to build containerized applications and the hosting OS

Deploy an Image Mode based RHEL 9 system on KVM

Upgrade to RHEL 10

Image mode Demo

Deploy a RHEL 9 virtual machine

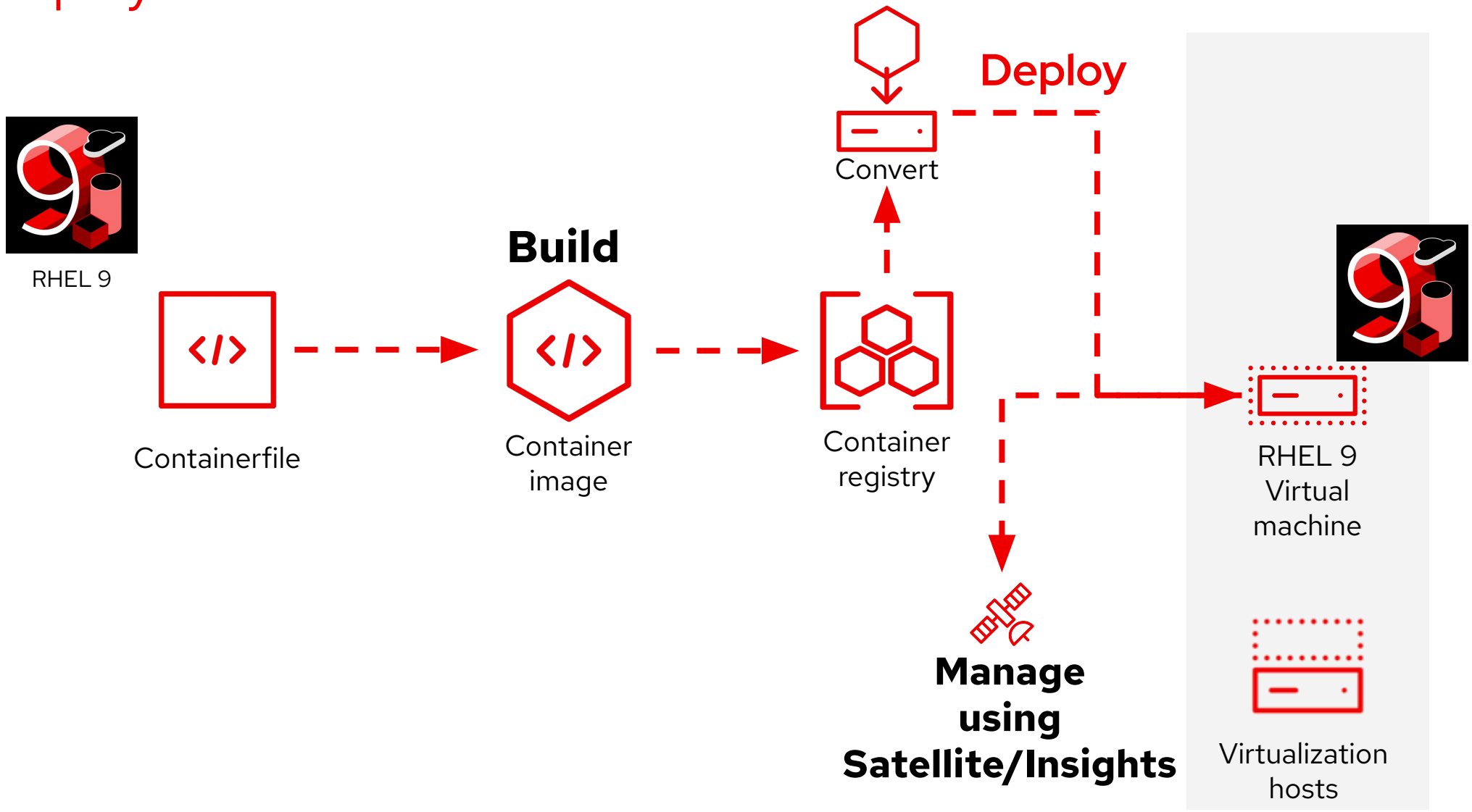

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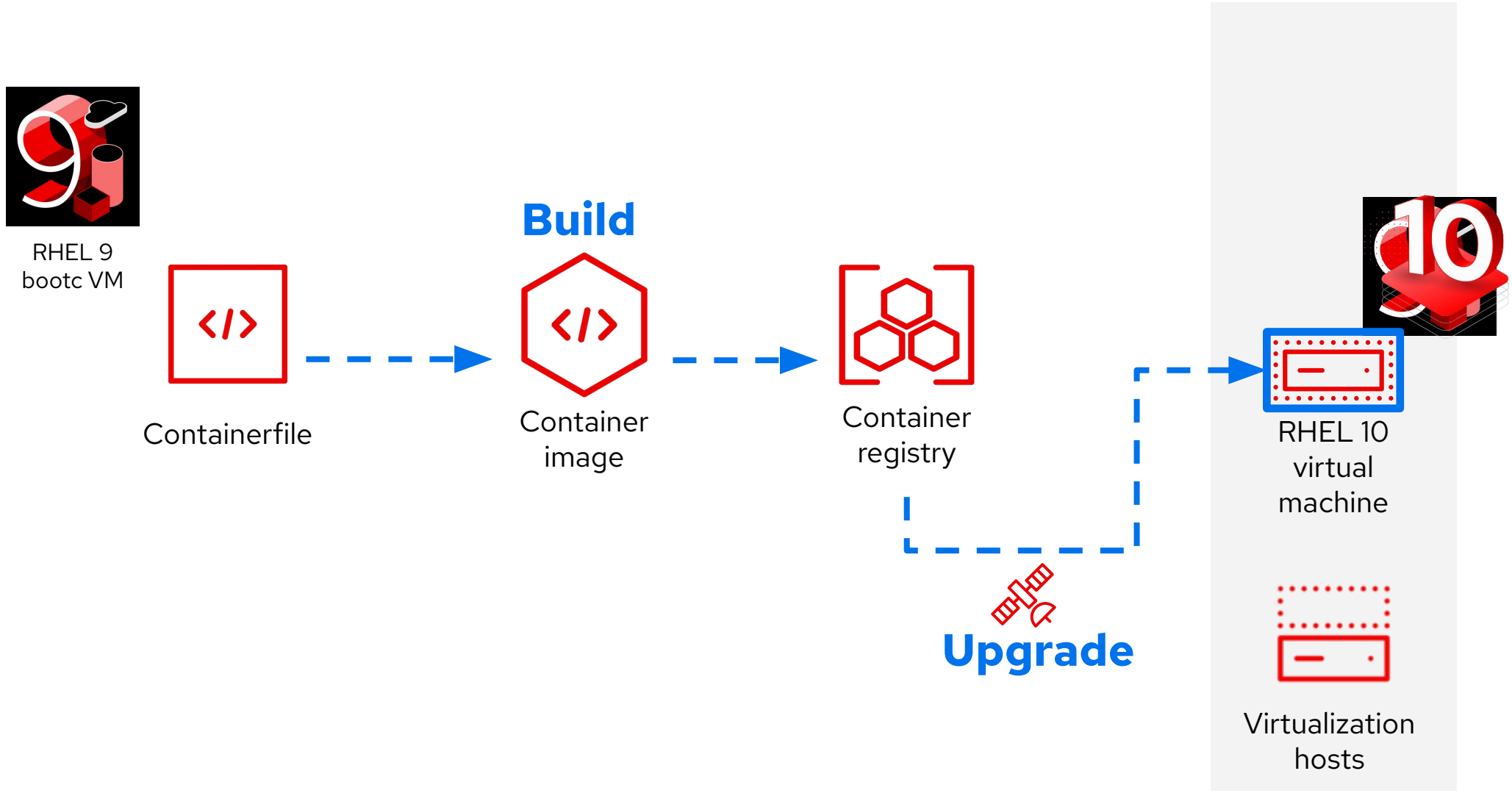
Image mode Demo

Upgrade the RHEL 9 virtual machine to RHEL 10



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