Red Hat
Enterprise Linux 10

Quiet Revolution in OS Space

The Image Mode

Red Hat

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Introducing RHEL Image Mode

Contain drift and accelerate delivery
With container tools and technologies

Make better decisions at build time
When it’s typically easier and cheaper to make changes

Deploy seamlessly to any environment
Consistent across all environment with ease of a container

Manage fleet of systems
Familiar tools to maximize your potential

Contain Drift, and Accelerate Delivery

With container tools and technologies

Outcomes

What does image mode fix 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

Introducing image mode for Red Hat Enterprise Linux

Combining the power of RHEL with the benefits of containers

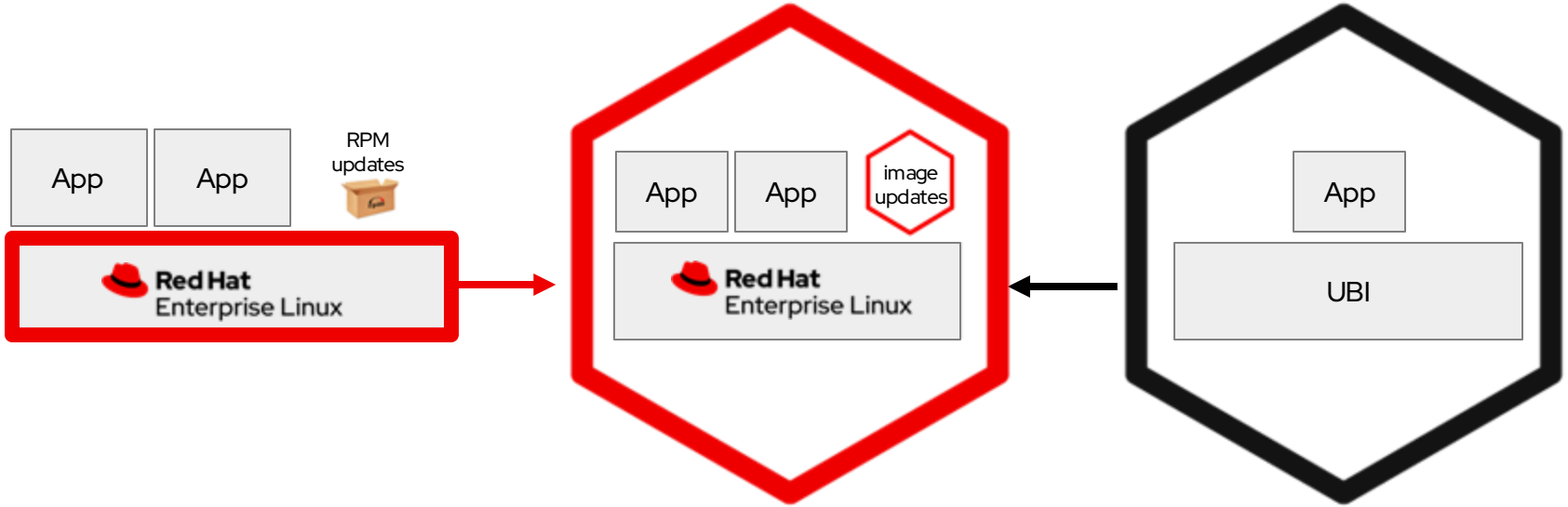
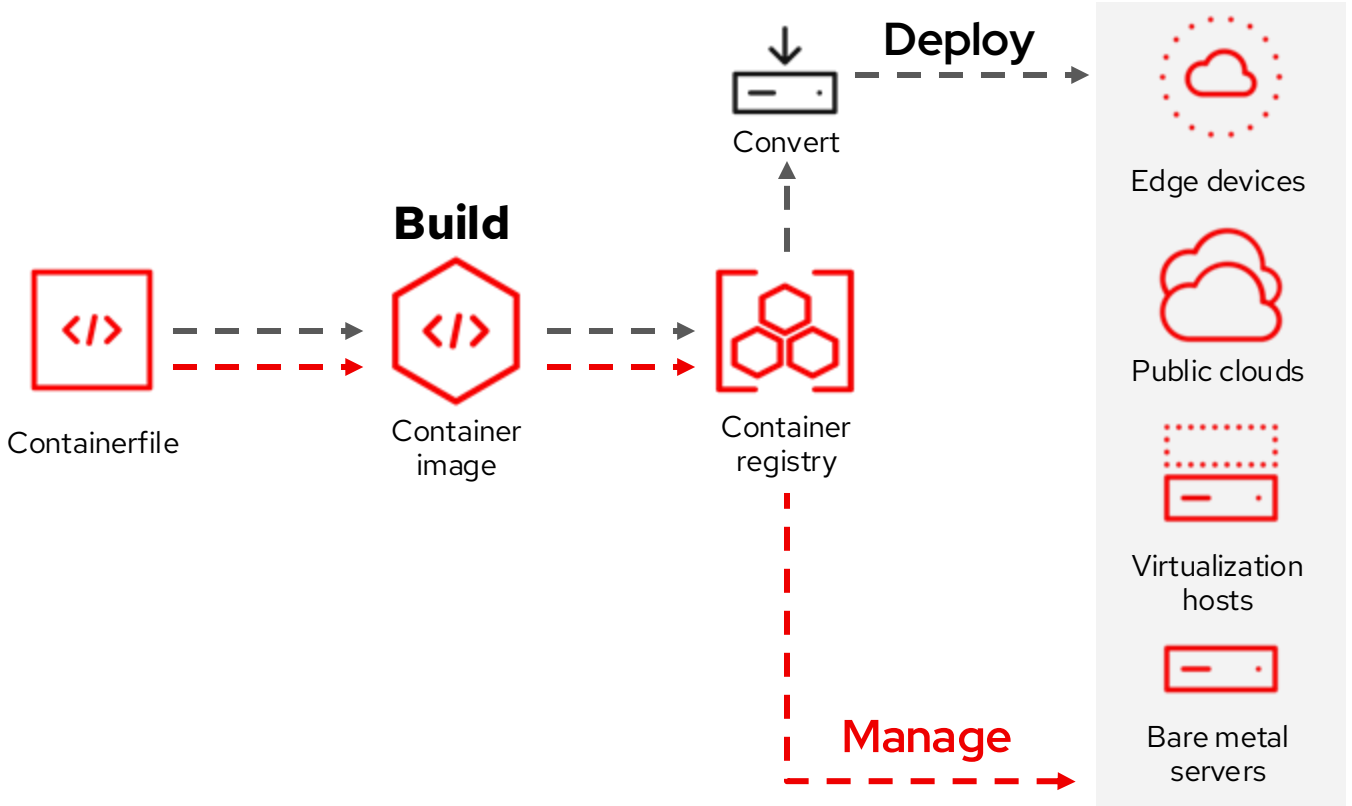


Image mode for Red Hat Enterprise Linux

Simple. Consistent. Anywhere.



Build

Image mode for RHEL

Encapsulate differences in a sequence of builds

```
# Derive standard operating
environment
FROM rhel10/rhel-bootc:latest

RUN dnf install -y [system agents]
[dependencies] && dnf clean all

COPY [unpackaged application]
COPY [configuration files]

RUN [config scripts]
```

```
# Derive database server from SOE
FROM corp-repo/corp-soe:latest

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

COPY [configuration files]

RUN [config scripts]
```

registry.redhat.io/rhel10/rhel-bootc

The RHEL bootc image is available in technology preview

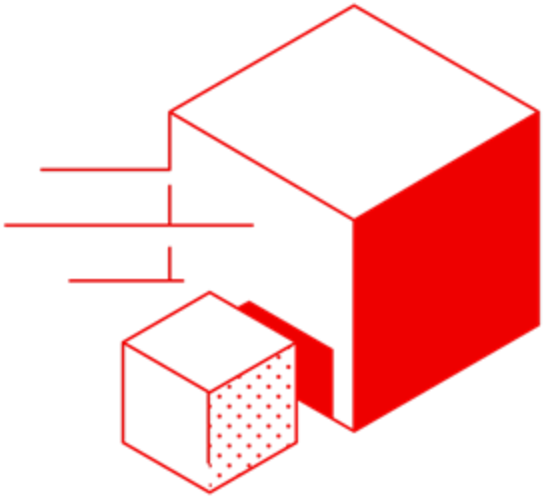


Image Specs:

- 439 rpms
- ~785M compressed
- ~2.2G on disk

Primary contents:

- systemd, kernel, bootc
- rpm-ostree[1]
- linux-firmware
- NetworkManager
- podman
- python
- Misc CLI tools: jq, sos

No cloud-init or virt agents

Documentation

Deploy

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……."

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

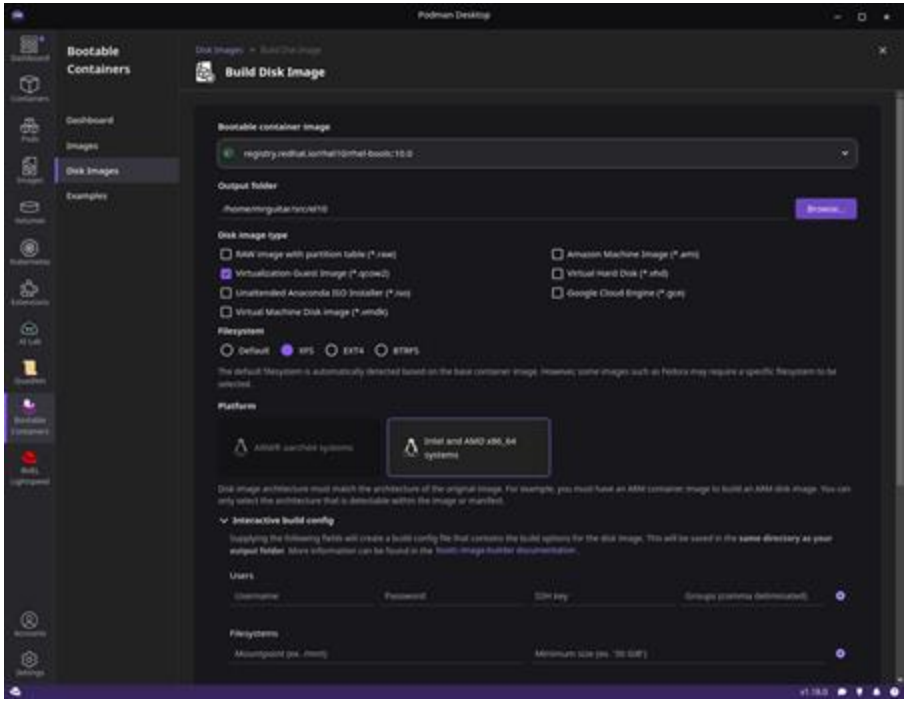
Bootc image builder

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

The Podman Desktop you love - *simplified container management and intuitive UI* - now extends to your RHEL workflows and available by default in the Extension Channel.

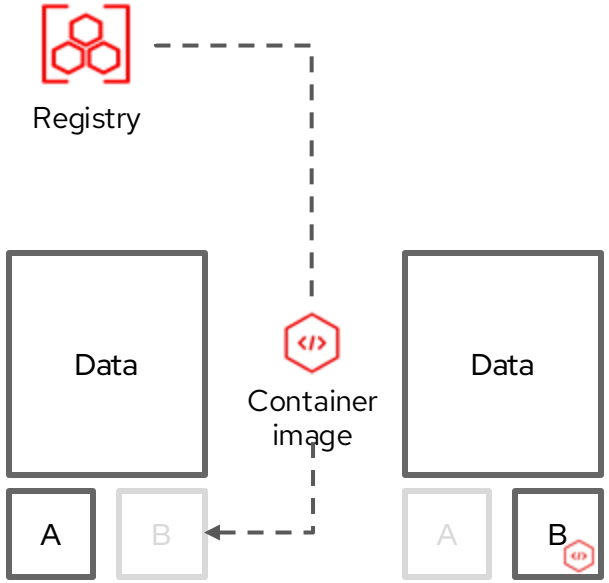
- **Standardize Container Environment:** Developers use a consistent set of tools and practices, making it easier for IT/Ops to manage and deploy containers in production.
- **Cross-Platform Consistency:** familiar experience across Windows, Mac and now RHEL.

`qcow2`	QEMU Disk Image
`ami`	Amazon Machine Images
`vmdk`	Virtual Machine Disk Image (vSphere, etc.)
`vhd`	Azure / Hyper-V disk image
`gce`	Google Compute Engine image
`raw`	Raw disk image GPT partition table
`anaconda-iso`	Bare Metal installer



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 (9.4 → 9.5), as well as major releases (9.4 → 10.0)

Filesystem Layout

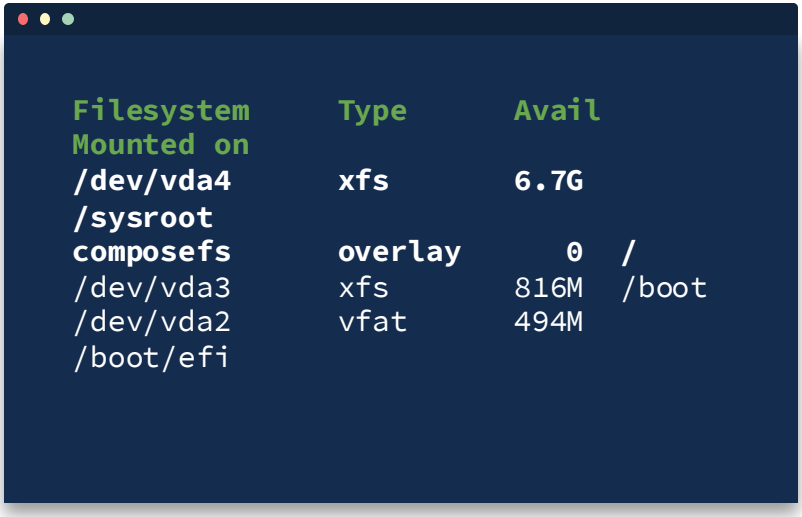
Similar to previous ostree setups - but better!!

Build Time
Everything is writable. e.g. /usr, /etc, /opt, ...

Run Time
All image content is read only

/var - RW, instance persistence. Not updated post install

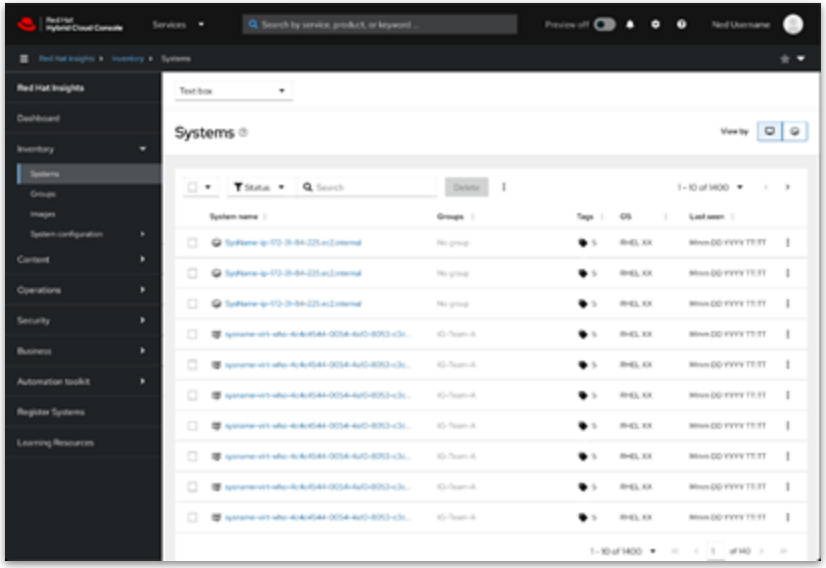
/etc - RW, 3-way merge like RHEL CoreOS. Machine local state (hostname, static IP)



Manage

Flexible Management

Leverage your preferred management system



Red Hat Insights

Red Hat Insights

Image mode systems can be scanned for security and operational recommendations, and image updates.

Red Hat Satellite

6.17 brings image mode support across provisioning, client management, and an included container registry.

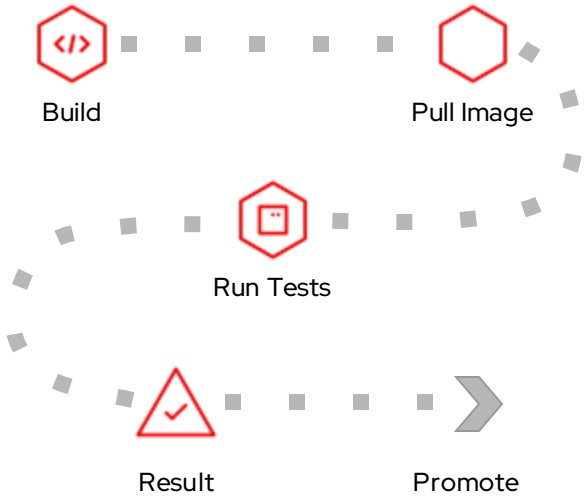
Ansible Automation Platform

Ansible can control content and configuration during build time and configuration at runtime. The community bootc collection simplifies client control.

Red Hat

Validating OS updates has never been easier

CI pipelines used for apps now work with the OS



Test/validate as a container

Bootc images can run as bare metal, VMs, **and containers**. This enables faster and lighter weight testing/validation of each build's userspace.

Easy pipeline integration

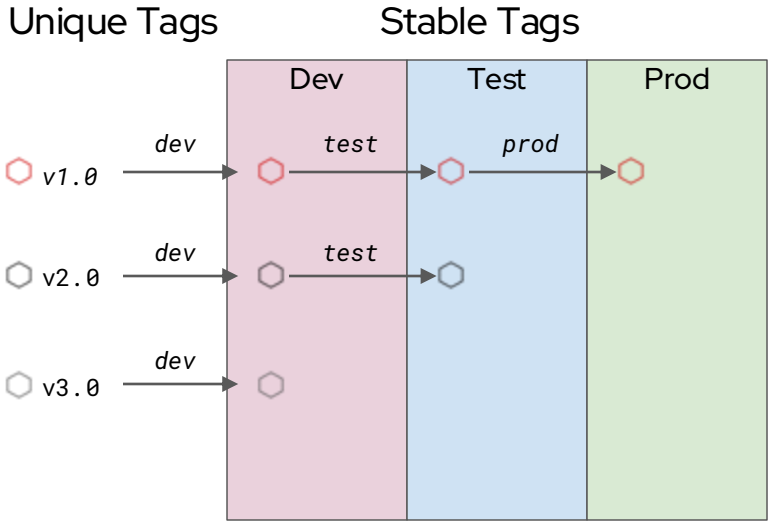
Containers have broad support across Github, Gitlab, Gitea, Circle CI, Jenkins, etc for the common container related tasks and testing. Use any system you like..

Simple promotion through registry tagging

Tags are a powerful tool to identify dev → test → prod promotions.

OS Updates via Container Registries

Tagging is powerful to version and promote updates



Tags offer simple versioning and visibility

Tags are simple to automate and use for promotions. Bootc will default to updating from a `repository:tag`.

Control updates via tagging

Combine tagging with the optional automatic updates to control fleets of systems via registry tags.

Standardized & scaleable infra

Container registries scale very well and any standard registry can be used.

CI/CD and Automation tools

It works with your favourite tool!

- Example templates available!
  - https://gitlab.com/redhat/cop/rhel/rhel-image-mode-cicd

Use Cases

Where does image mode fit?

Use Cases Blog

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

Labs and resources

Labs available !!!

Command Line Assistant

Try the AI assistant - https://red.ht/lab-rhel-cla

Image Mode Basics

Build and deploy an Image Mode system - https://red.ht/lab-image-mode

Image Mode Day 2 Operations

Manage a virtual machine running in Image Mode - https://red.ht/lab-image-mode-day2

RHEL 10 (beta) Open Lab

Ready to explore an installed RHEL 10 system? - https://red.ht/lab-rhel10-beta

Red Hat Satellite Basics

Basics of what is new in Satellite 6.17 - https://red.ht/lab-satellite-basics

Satellite Advanced Topics 6.17

Advanced lab on what is new in Satellite 6.17 - https://red.ht/lab-satellite-advanced

Rootless Podman Lab

Learn how to configure a docker image to run as a rootless podman service - https://red.ht/lab-podman-roo

Building Pods and using Quadlets

Build podman pods and define them as services using Quadlets - https://red.ht/lab-podman-pods

https://labs.redhat.com

Try it yourself!

The whole demo shown in this session and other use cases are available in the following Github repository:

https://red.ht/rhel-image-mode-demo

Everybody is welcome to use it, fork and suggest improvements.

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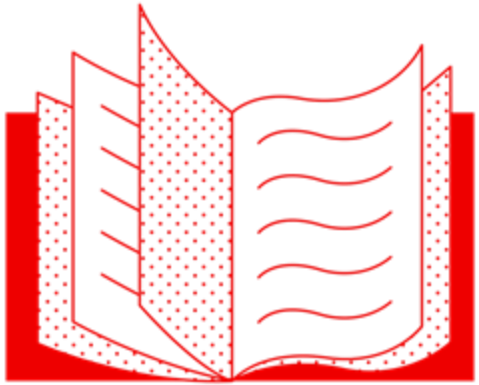
Useful resources

- RHEL Image mode on Red Hat Developers
  - https://developers.redhat.com/products/rhel-image-mode/overview
- RHEL Image mode documentation
  - https://docs.redhat.com/en/documentation/red_hat_enterprise_linux/9/html/using_image_mode_for_rhel_to_build_deploy_and_manage_operating_systems/index
- RHEL Image mode quickstart on Red Hat Blog
  - https://www.redhat.com/en/blog/image-mode-red-hat-enterprise-linux-quick-start-guide
- RHEL Image mode overview - YouTube
  - https://www.youtube.com/watch?v=QZDaTHyl1Sk
- RHEL Image mode Lab fast forward instructions
  - https://github.com/AutomationWitch/instruqt-mods/tree/main/image-mode



Thank you

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