A day in the life without Docker

A Developer's Guide

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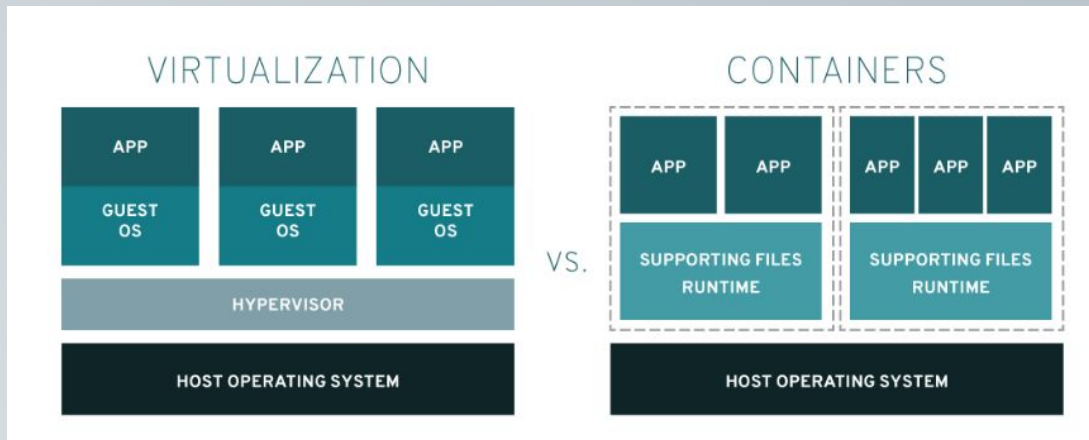Date

Agenda

- Container Overview

- Buildah
  - Demo
- Podman
  - Demo
- Skopeo
  - Demo

Brief overview of Containers

What is a container?

- **Linux is Containers, Containers are Linux**
- Containers are one or more processes isolated from the rest of the system.
- Containers have all the necessary files to run them are provided in a distinct image
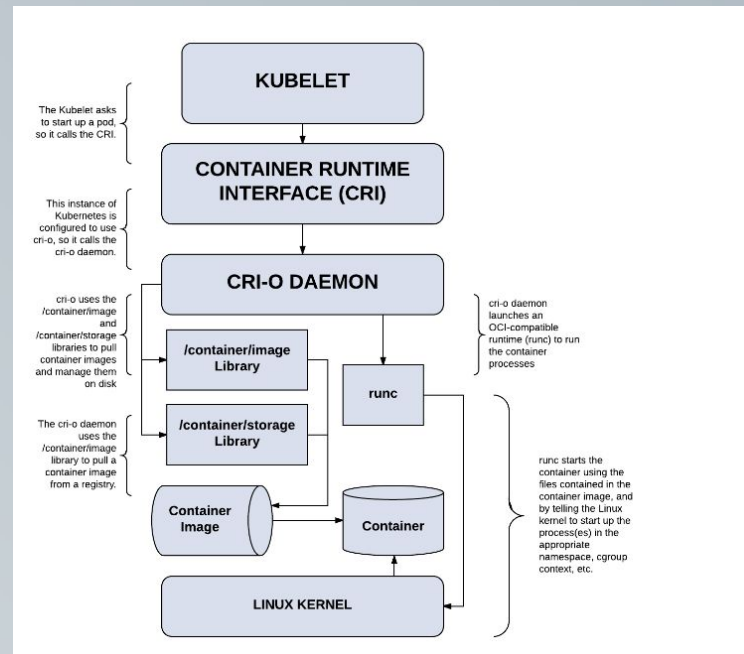
Container Images

- Docker introduced the concept of a container image - which is a standard TAR file
- Tar file consists of a rootfs (container root filesystem)
- A config file describing the image (config.json)
  - Command or Entrypoint
  - Working directory
  - Environment Variables

CRI-O: A Lightweight Container Runtime for Kubernetes

CRI - Container Runtime Interface

CRI-O is an implementation of the Container Runtime Interface (CRI) in Kubernetes using Open Container Initiative (OCI) images and runtimes.

Buildah

Buildah

- A tool and library for building Open Container Initiative (OCI) container images
- Creates a rootfs directory on disk and allow other tools to populate the directory, then creates the container configuration JSON file
- Allows you to push images to a container registry where it could be used by any container engine, like Docker, Podman, CRI-O, or another Buildah
- Supports Dockerfiles
- Allows developers to build images without root

Commands

- **Build a container from a Dockerfile:** Use a Dockerfile to build a new container image (`buildah bud`).
- **Build a container from another image or scratch:** Build a new container, starting with an existing base image (`buildah from <imagename>`) or from scratch (`buildah from scratch`)
- **Inspecting a container or image:** View metadata associated with the container or image (`buildah inspect`)
- **Mount a container:** Mount a container's root filesystem to add or change content (`buildah mount`).
- **Create a new container layer:** Use the updated contents of a container's root filesystem as a filesystem layer to commit content to a new image (`buildah commit`).
- **Unmount a container:** Unmount a mounted container (`buildah umount`).
- **Delete a container or an image:** Remove a container (`buildah rm`) or a container image (`buildah rmi`).
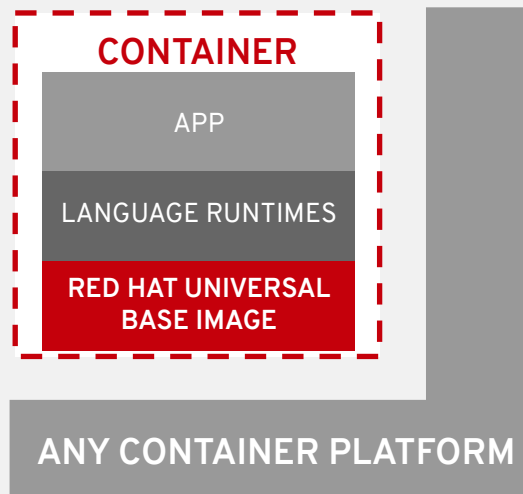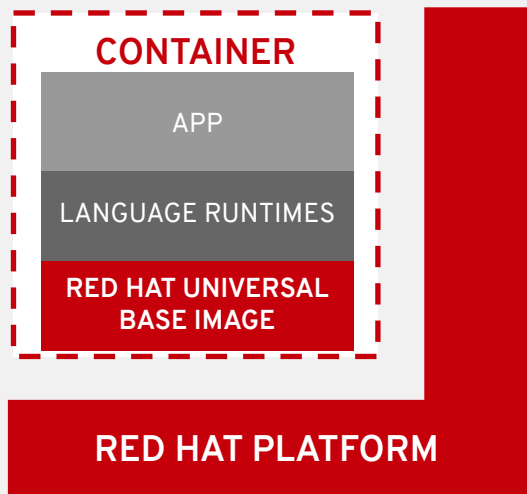
Demo

INTRODUCING THE RED HAT UNIVERSAL BASE IMAGE

redhat.

THE RED HAT UNIVERSAL BASE IMAGE

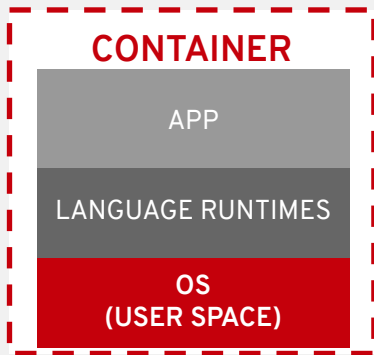What if you could…

CONTAINER

APP

LANGUAGE RUNTIMES

RED HAT UNIVERSAL BASE IMAGE

RED HAT PLATFORM

CONTAINER

APP

LANGUAGE RUNTIMES

RED HAT UNIVERSAL BASE IMAGE

ANY CONTAINER PLATFORM

"Build once, deploy anywhere"

redhat.

THE BASE IMAGE FOR ALL OF YOUR NEEDS

Enterprise architecture, security and performance

```
┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
|      CONTAINER        |
|  ┌─────────────────┐  |
|  │       APP       │  |
|  ├─────────────────┤  |
|  │ LANGUAGE RUNTIMES│ |
|  ├─────────────────┤  |
|  │       OS        │  |
|  │  (USER SPACE)   │  |
|  └─────────────────┘  |
└ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
```

The Red Hat Universal Base Image is based on RHEL and made available at no charge by a new end user license agreement.

Development

- Minimal Images
- Programming languages
- Enables a single CI/CD chain

Production

- Supported as RHEL when running on RHEL
- Same Performance, Security & Life cycle as RHEL
- Can attach RHEL support subscriptions as RHEL

redhat.

PODMAN

What is Podman?

A daemon-less CLI/API for running, managing, and debugging OCI containers and pods

- Fast and lightweight
- Leverages runC
- Provides a "docker-like" syntax
- Standard CNI networking
- Remote management API via Varlink
- Provides systemd integration and advanced namespace isolation
- Podman and Docker images are compatible
- Podman does more than "just" docker and can also manage pods

VARLINK

RHEL kernel

Podman Comparison

Podman command	Docker equivalent
podman run	docker run
podman exec	docker exec
podman info	docker info
podman inspect	docker inspect
podman logs	docker logs
podman ps	docker ps
podman stats	docker stats

DEMO

- https://asciinema.org/a/7OcQ7RkLfViwaMfbL2stAoFNF
- https://asciinema.org/a/r4VrNI4SNjFH4LyFFSuJQdJB8
- https://asciinema.org/a/Ykpzs2aoaREdd1XY8oKvFHGuz

Podman Looking Ahead

Roadmap:

- GA in RHEL 7.6 & RHEL 8
- Run containers as non-root (enhanced user namespaces)
- Docker compatible health checks
- Atomic run label support
- Export for Kube YAML (as non-root users)

Features

- a command line utility that performs various operations on container images and image repositories
- Copying an image from and to various storage mechanisms. For example you can copy images from one registry to another, without requiring privilege.
- Inspecting a remote image showing its properties including its layers, without requiring you to pull the image to the host.
- Deleting an image from an image repository.
- When required by the repository, skopeo can pass the appropriate credentials and certificates for authentication

skopeo

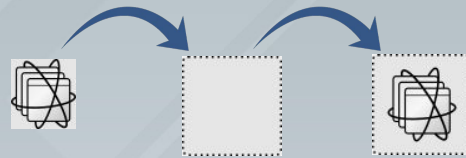Demo

Recap

Next-Gen Container Tools

Providing stability, flexibility and performance with containers and images

Container-tools - OCI tooling to create, run, and manage, Linux Containers with an enterprise life cycle.

- Conform to the OCI image and runtime specifications
- Daemon-less, OS-native container tooling
- Separation of concerns

buildah

Build OCI/docker Images

podman

RHEL

run, manage, debug containers

skopeo

Inspect, copy, & sign Images

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SECTION BREAK

CONTENT SLIDE

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