



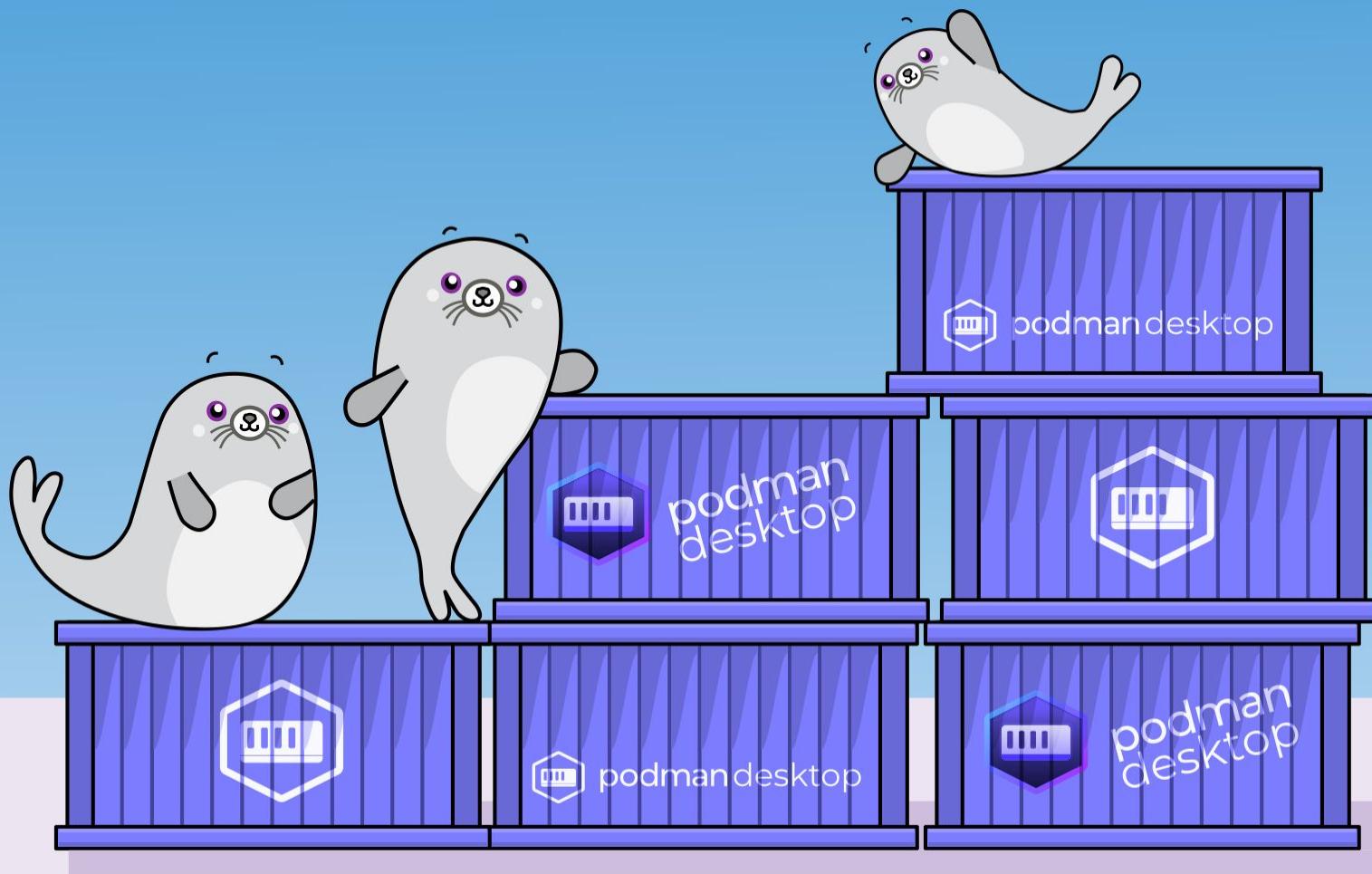
Simplifying containers, Kubernetes and AI on your laptop with Podman Desktop

Geoff Allen
Solution Architect
Red Hat

Matt Hargrave
Solution Architect
Red Hat

Application Discovery

What's Podman?



What is Podman?

A seamless way to work with containers (& Kubernetes!)



Fast and light

Daemonless, using the fastest technologies for a snappy experience.



Secure

Rootless containers allow you to contain privileges without compromising functionality.



Open

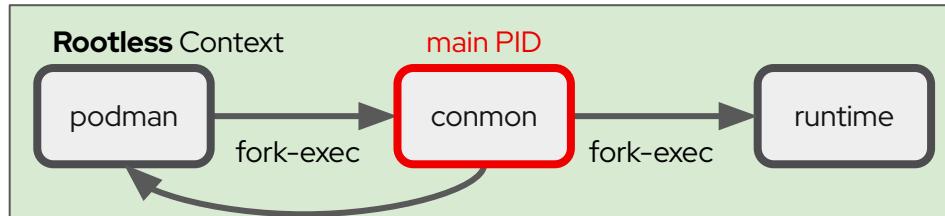
Podman is open source first and won't lock you in. Podman Desktop even supports Docker as an engine!



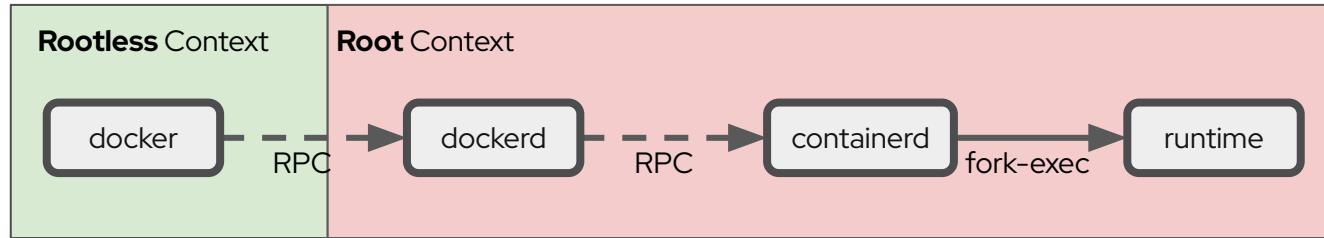
Compatible

Compatible with other OCI compliant container formats including Docker, as well as docker-compose files.

Container Engine Architectures



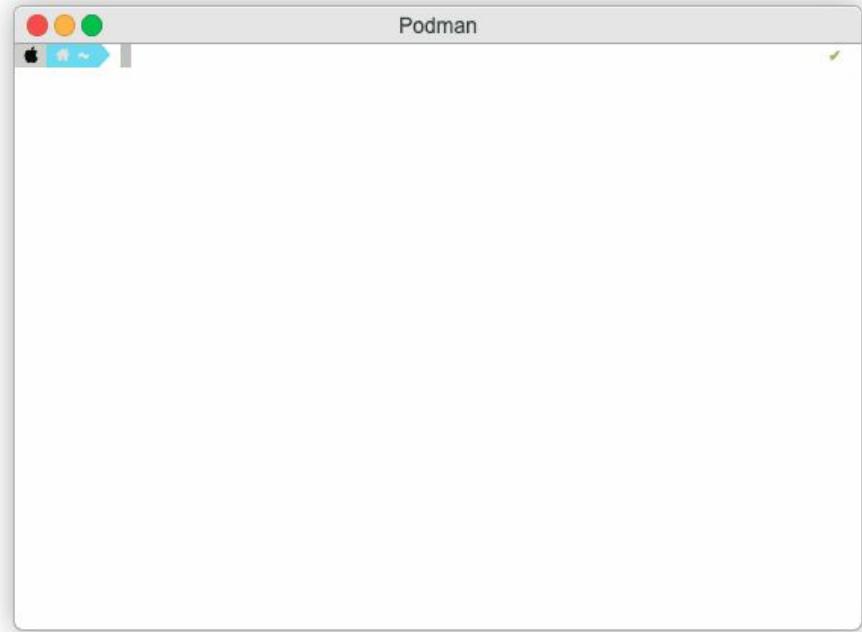
Compared to...



Podman in Action

It's easy to get started with Podman to manage containers and container images!

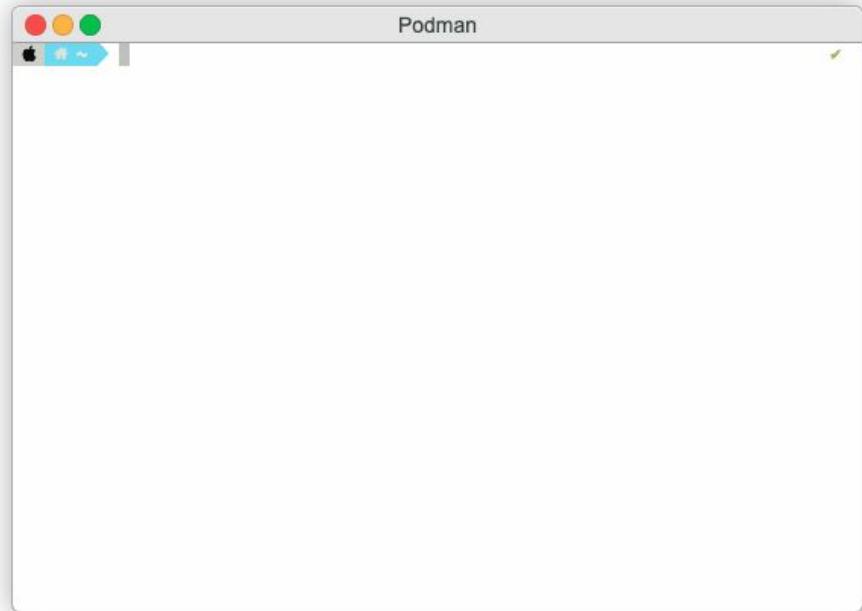
- ▶ Pulling, building, pushing images
- ▶ Running containers & debugging
- ▶ Working with Kubernetes
- ▶ & much more!



Podman in Action: **Images**

Container Images: Lightweight and isolated packages that encapsulate an application & its dependencies.

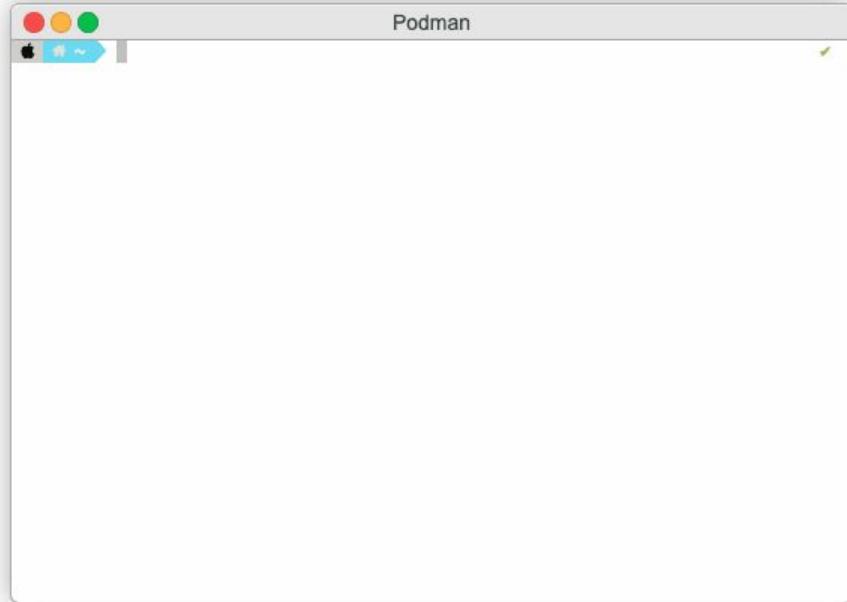
- ▶ podman search <image>
- ▶ podman pull <image>
- ▶ podman images
- ▶ podman build .
- ▶ podman push <image>



Podman in Action: **Containers**

Containers: Running instance of a container image, sharing host OS kernel and is ephemeral.

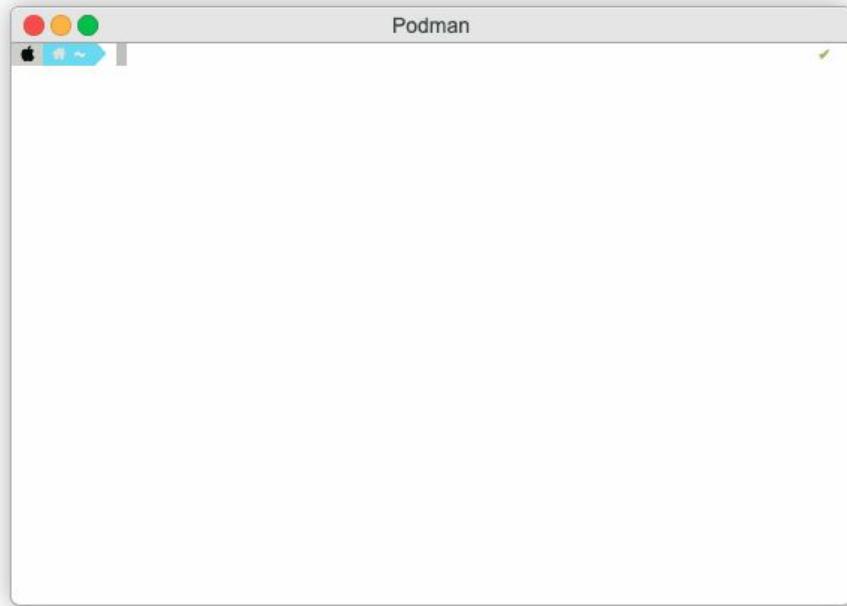
- ▶ podman run <image>
- ▶ podman ps
- ▶ podman attach
- ▶ podman logs <container>



Podman in Action: **Pods**

Pods: Group of containers that run together and share the same storage & network as a single unit.

- ▶ podman pod create <name>
- ▶ podman generate kube
- ▶ podman run --pod
- ▶ podman play kube



Podman better than Docker? For our customers YES

Enhanced Security:

Podman provides a highly secure container runtime environment by running containers with rootless user namespaces, reducing the risk of container breakout attacks.

Open Source and Community-Driven:

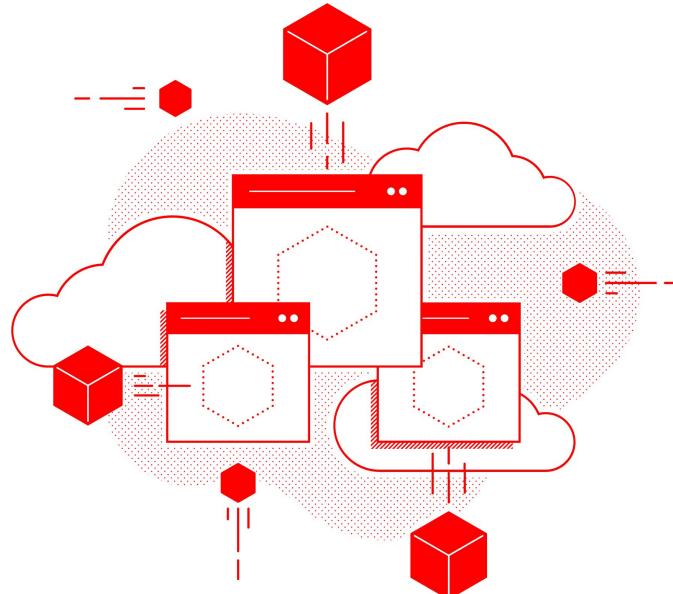
Podman is an open-source project with a community of contributors and users. It benefits from continuous improvements, bug fixes, and new feature development through collaborative efforts.

Enterprise Support and Portfolio Enablement:

One of the advantages of Podman being included with Red Hat Enterprise Linux is the support and integration it receives from Red Hat.

Kubernetes Compatibility:

Podman, as a container runtime, is fully compatible with OpenShift. This means that your existing containers, which run seamlessly on Podman, can be migrated and deployed on OpenShift without requiring any modifications or translations.



More About Docker vs Podman

Some resources to check out... later!



Podman vs. Docker



IBM Technology 656K subscribers

Subscribe

1.5K Share ...

50K views 6 months ago Kubernetes Essentials
IBM and Red Hat solutions → <https://ibm.biz/BdykC2>



Is it time to switch from Docker to Podman?



Christian Lempa 182K subscribers

Subscribe

4.2K Share ...

140K views 4 weeks ago In this video, we will be exploring an alternative to Docker - Podman. With its claims of being faster, more

Wait wait wait, there's more!?



Podman in Action: **Compose & Beyond!**

Compose: Define and run multi-container applications.

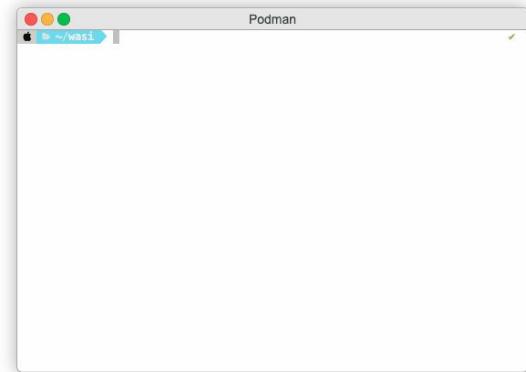
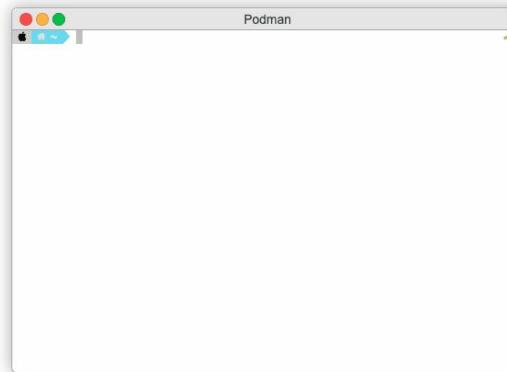
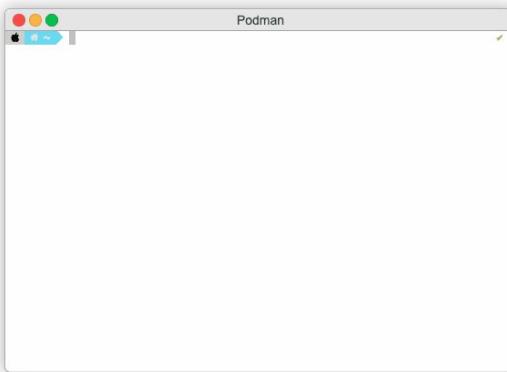
- ▶ podman compose up
- ▶ podman compose list

Docker Socket: podman engine can bind /var/run/docker.sock

- ▶ docker ps, images, run
- ▶ docker (your command here!)

WebAssembly: Execute and create WASM workloads in containers

- ▶ podman run (or build!) --platform wasi/wasm



A refresh of the Podman 101's



Secure Containers

User namespace mapping, seccomp profiles, and SELinux support

No Daemon Process

Podman launches containers as child processes, fork/exec model

Kubernetes Support

Supports Kubernetes YAML & testing before cluster deployment

Platform Compatible

Runs on Linux, as well as Windows, Mac OS, FreeBSD

Podman in Deployments and Production

- ▶ Podman is lightweight and standalone, with seamless SystemD integration
- ▶ Podman provides basic container orchestration features such as pod management & Quadlet SystemD generation.

The terminal window shows a unit file named `techxchange.service` with the following content:

```
[Unit]
Description=TechXChange Example

[Container]
Image=registry.access.redhat.com/ubi8/ubi
Volume=/mypath:/container/path
Exec=sleep 100

[Service]
Restart=on-failure
```

To the right of the terminal, a Red Hat blog post is displayed:

Deploying a multi-container application using Podman and Quadlet

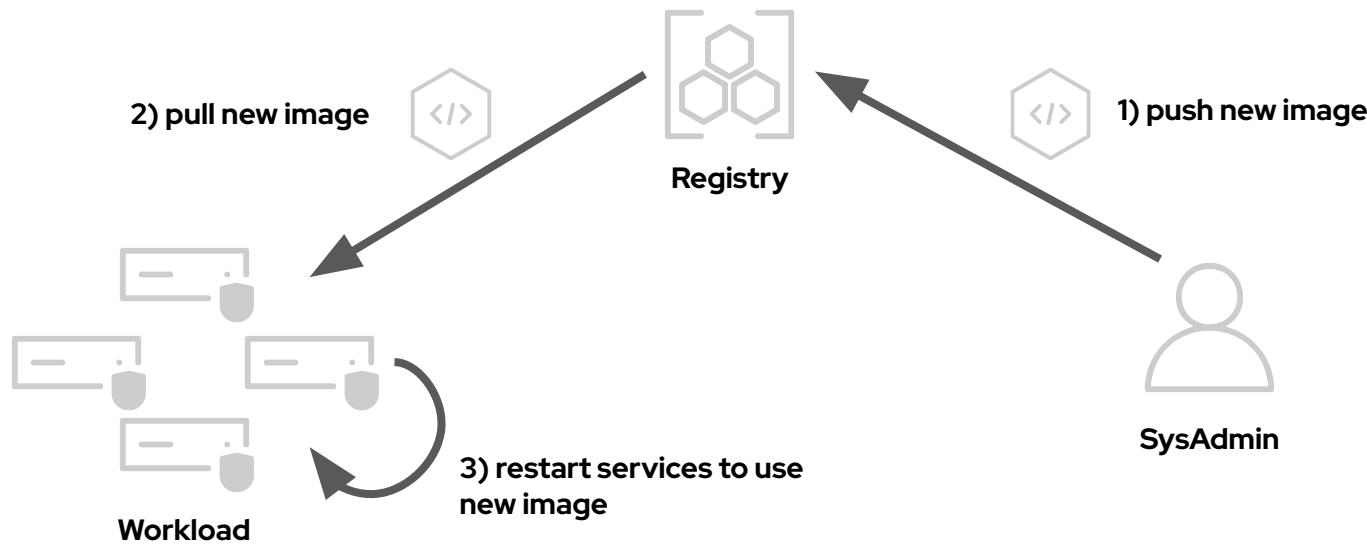
Learn about the unit files Quadlet supports and how to use them to deploy containers using Podman.

How to use auto-updates and rollbacks in Podman

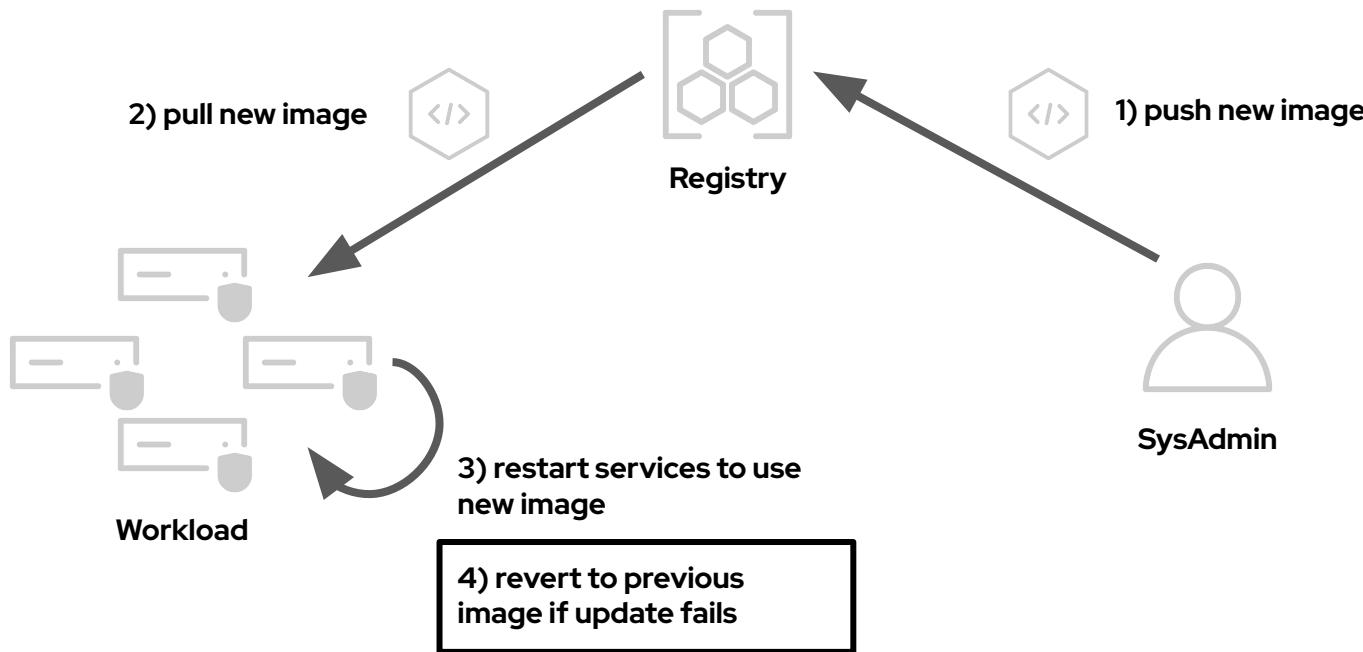
New auto-update capabilities enable you to use Podman in edge use cases, update workloads once they are connected to the network, and roll back failures to a known-good state.

Posted: October 6, 2021 | 9 min read | Valentin Rothberg (Sudoer alumni, Red Hat), Preethi

Podman Auto Updates



Podman Auto Rollbacks



What's Podman Desktop?

What's going on between local and prod environments?

"Local developer environments have become **impractical** and **lack of consistency** with production."



Additional complexity

Exposed level of complexity and additional overhead required to go cloud native.



Skills Gap

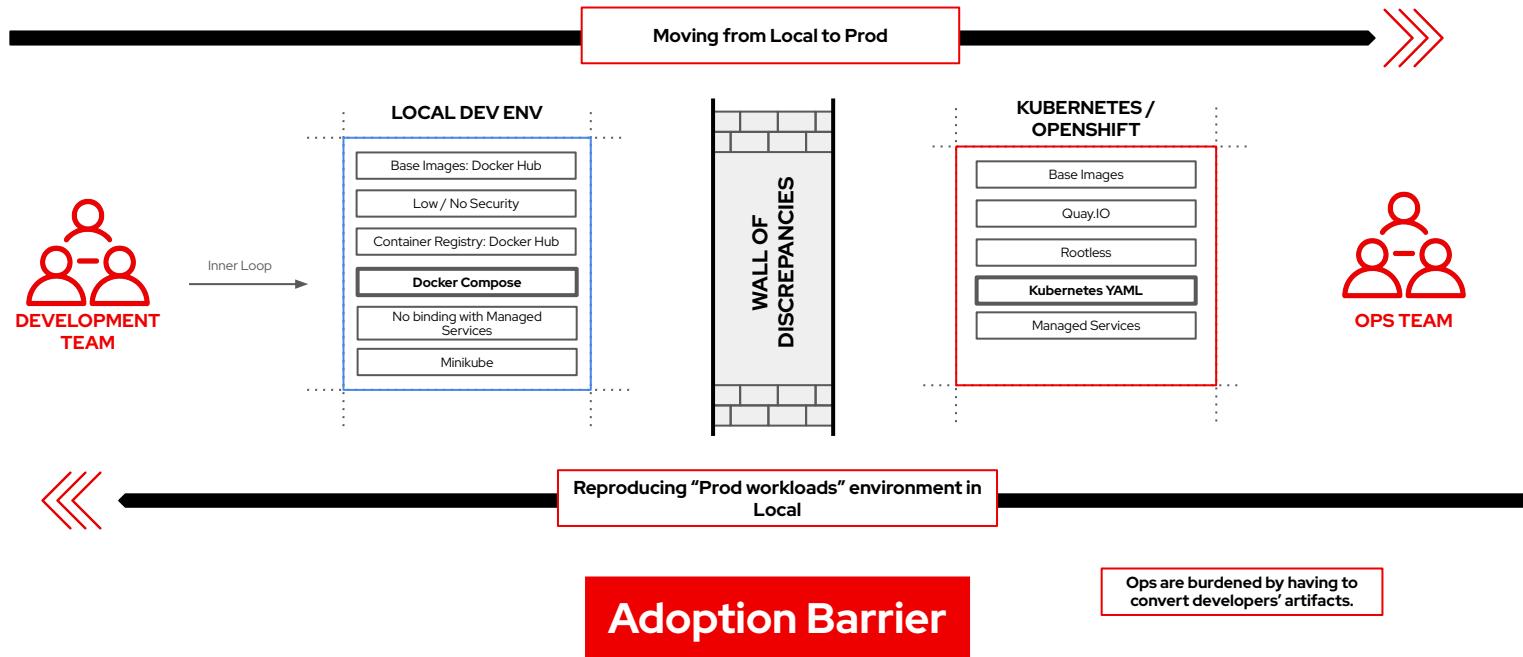
Lack of skilled workforce and technological expertise. 70% IT departments have a single expert team on Kubernetes. (1)



Devs & Ops disconnect

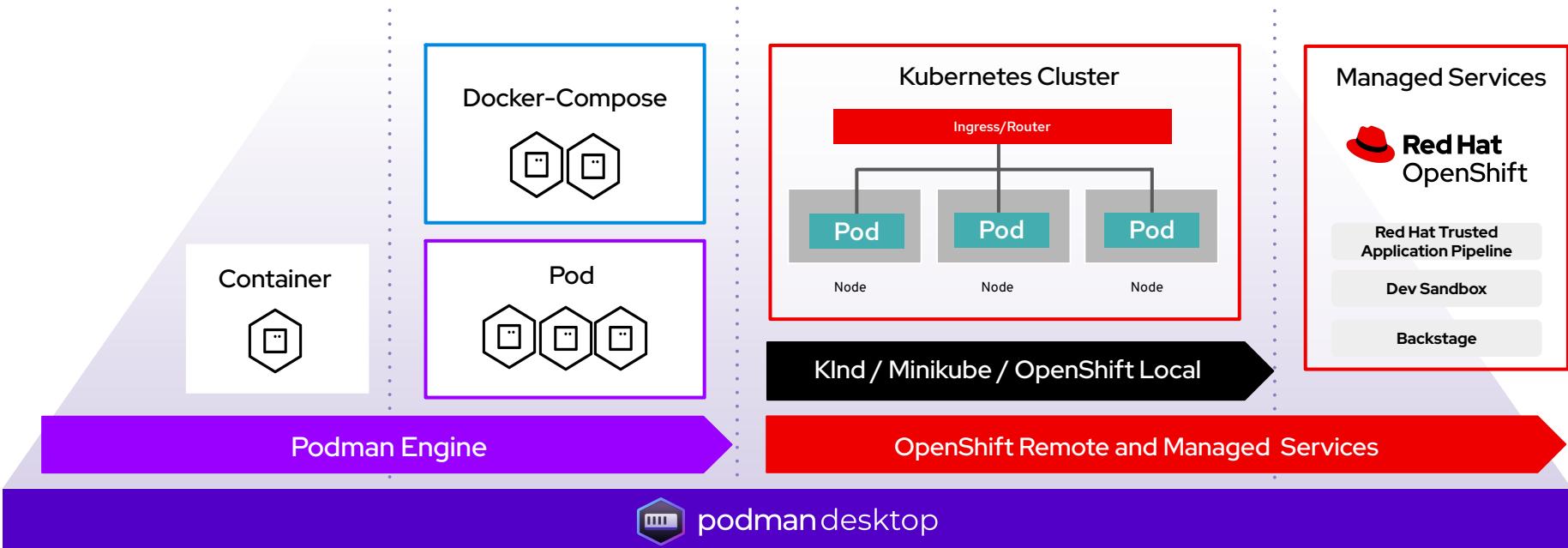
82% IT departments claim Kubernetes creates conflicts. (2)

Challenges from local developer environments to deployments on production



Simplistic onboarding.

From applications to containers, to pods, to Kubernetes.



Introducing Podman Desktop: Community Edition

Containers and Kubernetes for Application Developers

Podman and Kubernetes/OpenShift Local

- Install and run anywhere: Windows, Mac and Linux
- Keep it up-to-date

Containers and Pods

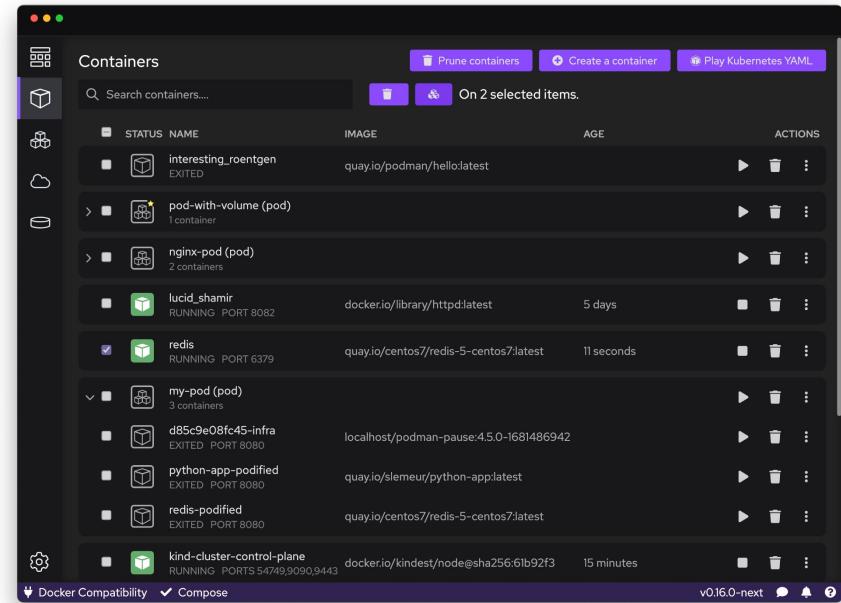
- Build, run, manage and debug Containers and Pods
- Run Pods with or without Kubernetes
- Manage multiple container Engines
- Compatibility with Docker and Compose

Enterprise Readiness

- VPN and Proxies configuration
- Image registry management
- AirGapped Installation

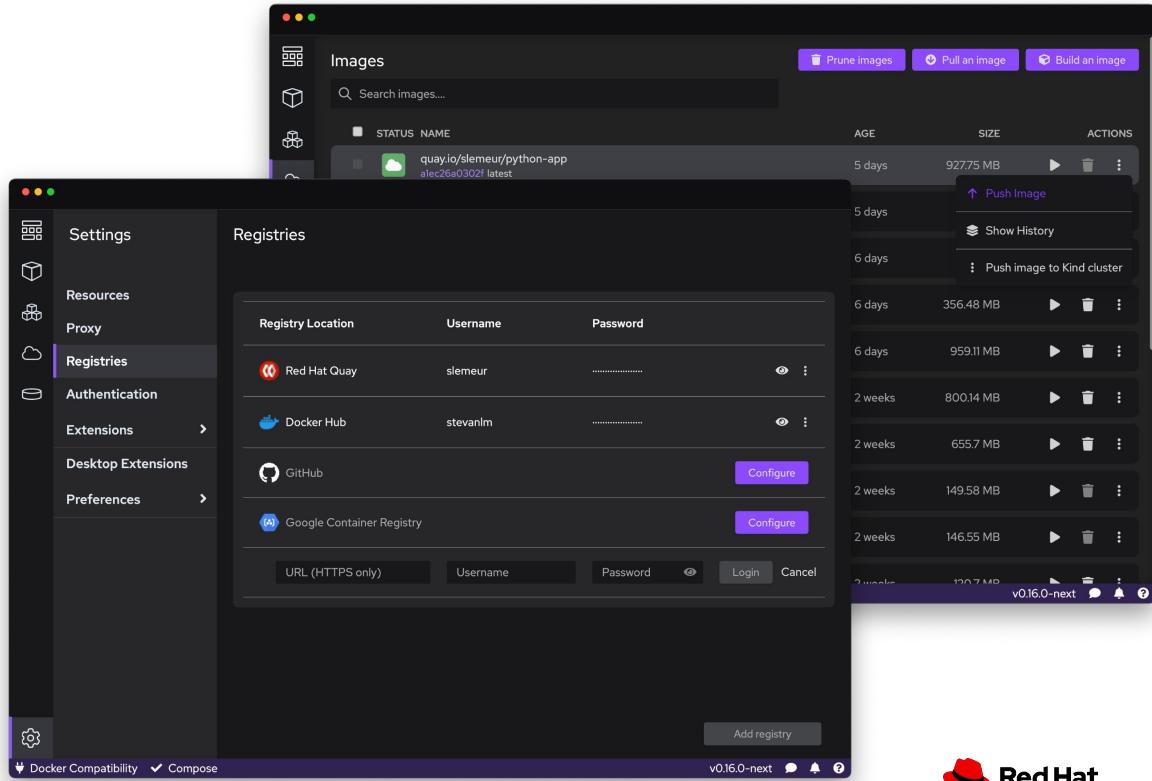
Bridge between local and remote

- Connect and deploy to remote OpenShift clusters
- Enable remote managed services locally



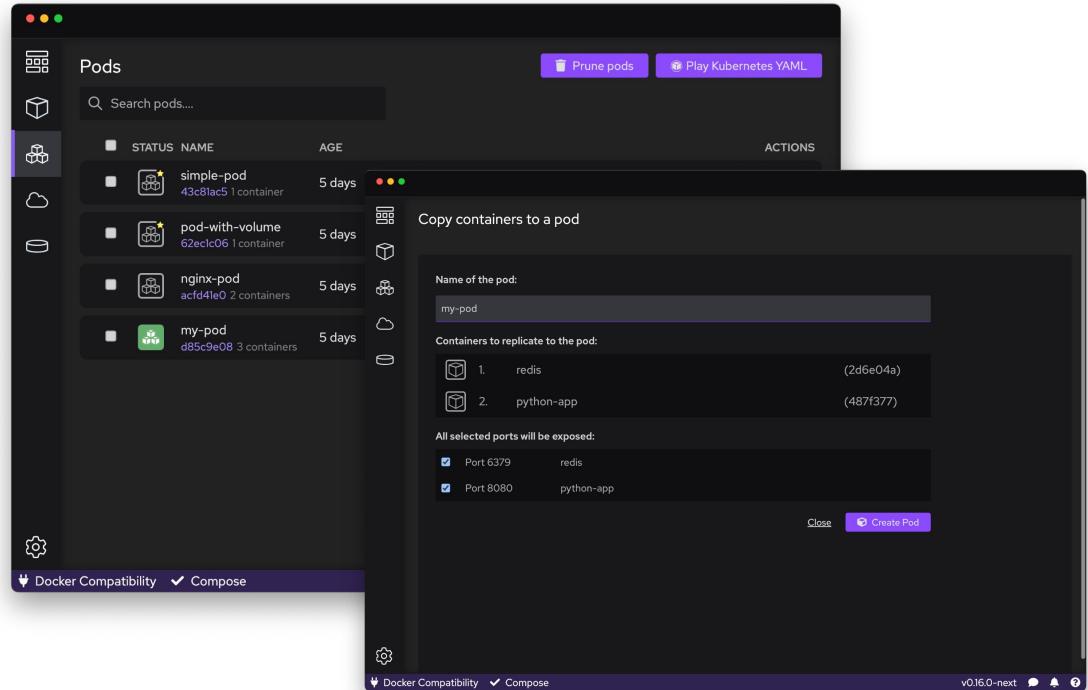
Podman Desktop: Support for OCI Registries

- Configure multiple OCI registries
- Authenticate to registries
- Pull, tag and push images to your registries



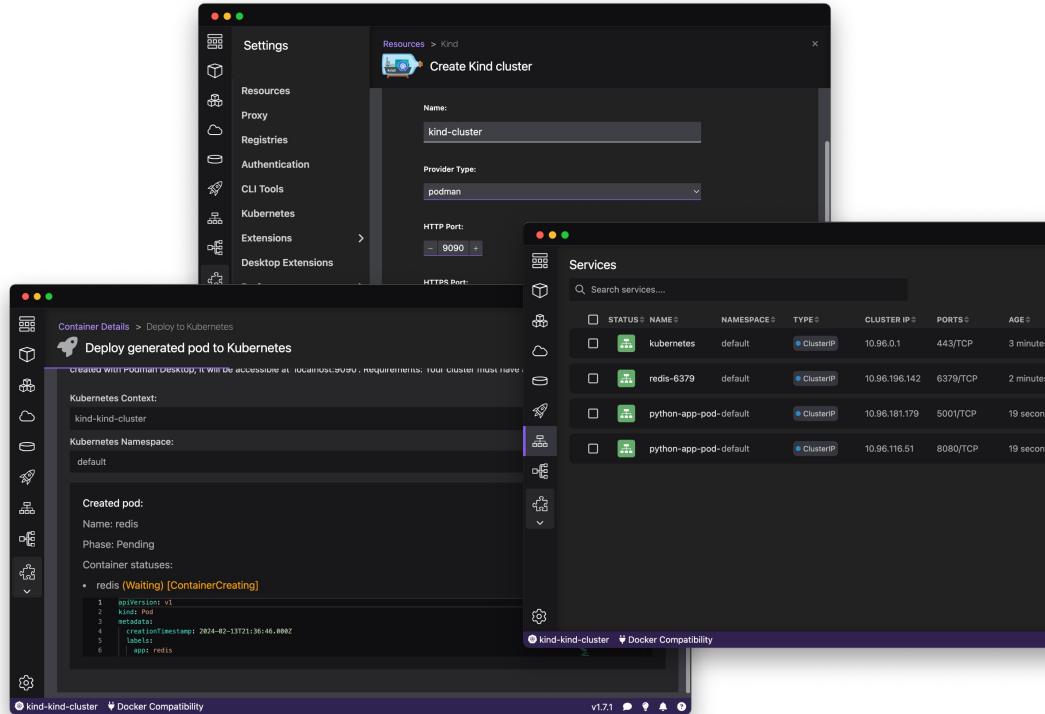
Podman Desktop: Pods

- Create and start Pods with Podman
- Select containers to run as a Pod
- Play Kubernetes YAML locally without Kubernetes
- Generate Kubernetes YAML from Pods



Podman Desktop: Kubernetes Integration

- Easily move from containers to Kubernetes through the Kubernetes UI for Deployments, Services, and Ingress & Routes
- Create local Kubernetes clusters using [Kind](#) or [Minikube](#) for local development and testing
 - Easily push images from Podman Desktop to your clusters
- View and select your current Kubernetes context in the Podman Desktop tray for deployment
- Automatically expose services locally & create routes to your applications (with OpenShift)





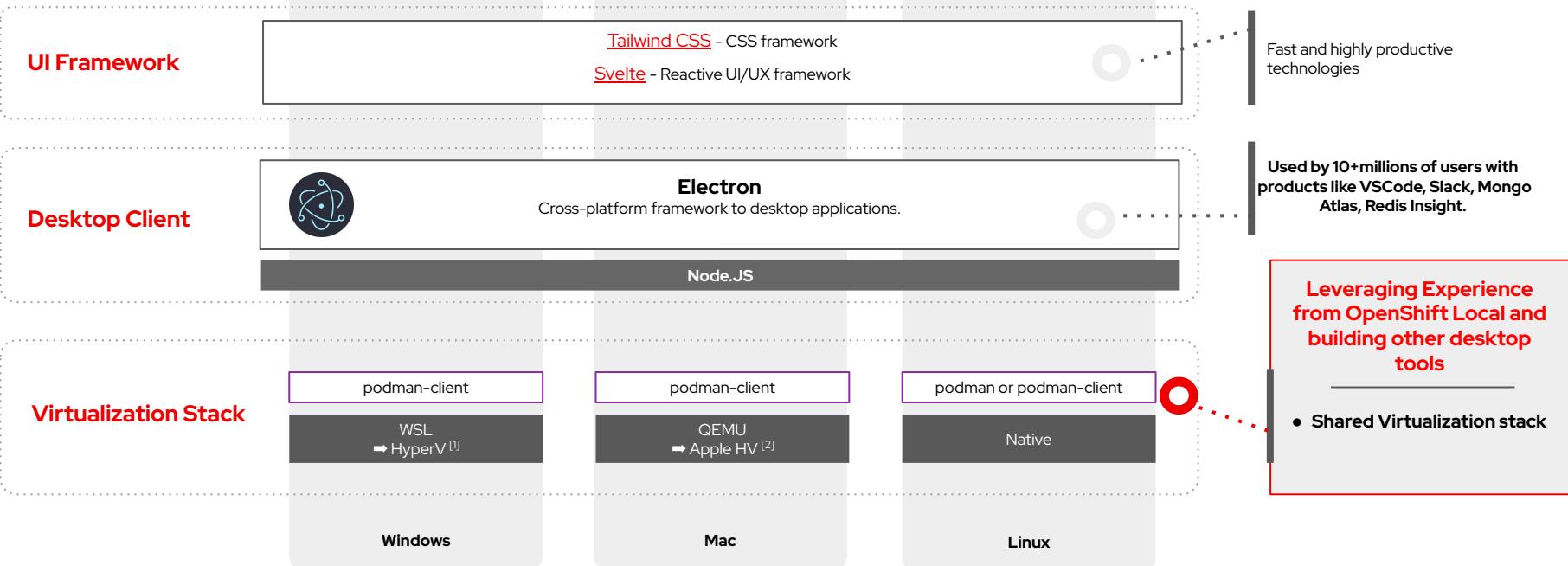
podman desktop

Free, Open and Extensible

-

By Default

Podman Desktop: Behind the Scenes



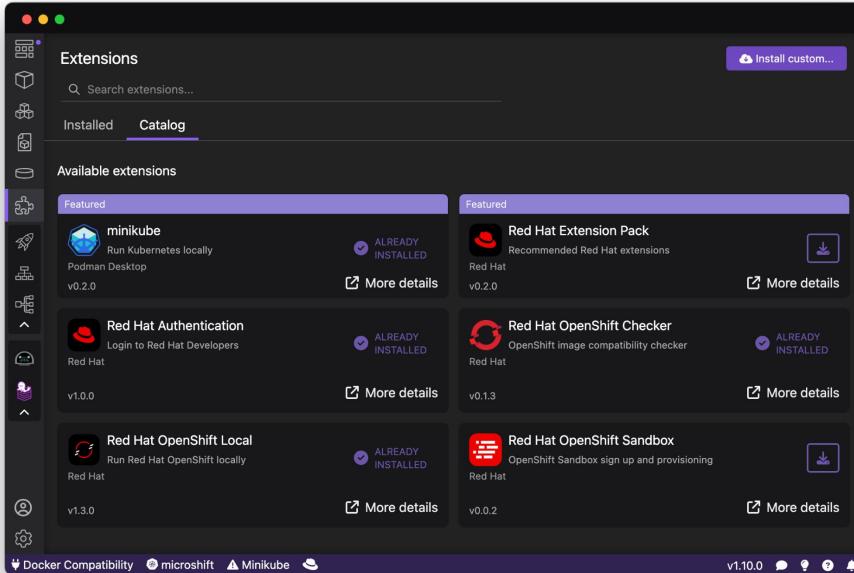
^[1] HyperV under active development

^[2] Apple Hypervisor support in early (but active) planning

Extensibility with Podman Desktop

Enabling extension points and other container/K8s technologies

Supports Docker
Desktop extensions



But Podman Desktop extensions can also do much more:

- Container engine providers
- Kubernetes providers
- Add actions
- Add menus
- Add configuration
- Add default registries
- Add to status bar
- Add to system tray

Current
extensions:



Podman



Kind

Lima



Docker



OpenShift Local

& more!



Podman AI Lab

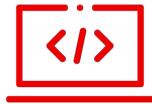
*Your pathway to Gen AI, bridging
with containers and Kubernetes*



[Dedicated deck](#)

Why Podman AI Lab Matters!

& how it accelerates the AI application development workflow.



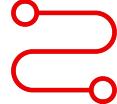
Run LLM's Locally

Simplify the environment for developing and debugging AI-enabled applications in your inner loop.



Cost Efficiency

Running AI models locally reduces cloud computing costs and vendor locking.



Gen AI Education

Learn how to infuse AI in your applications through sample use cases and best practices.

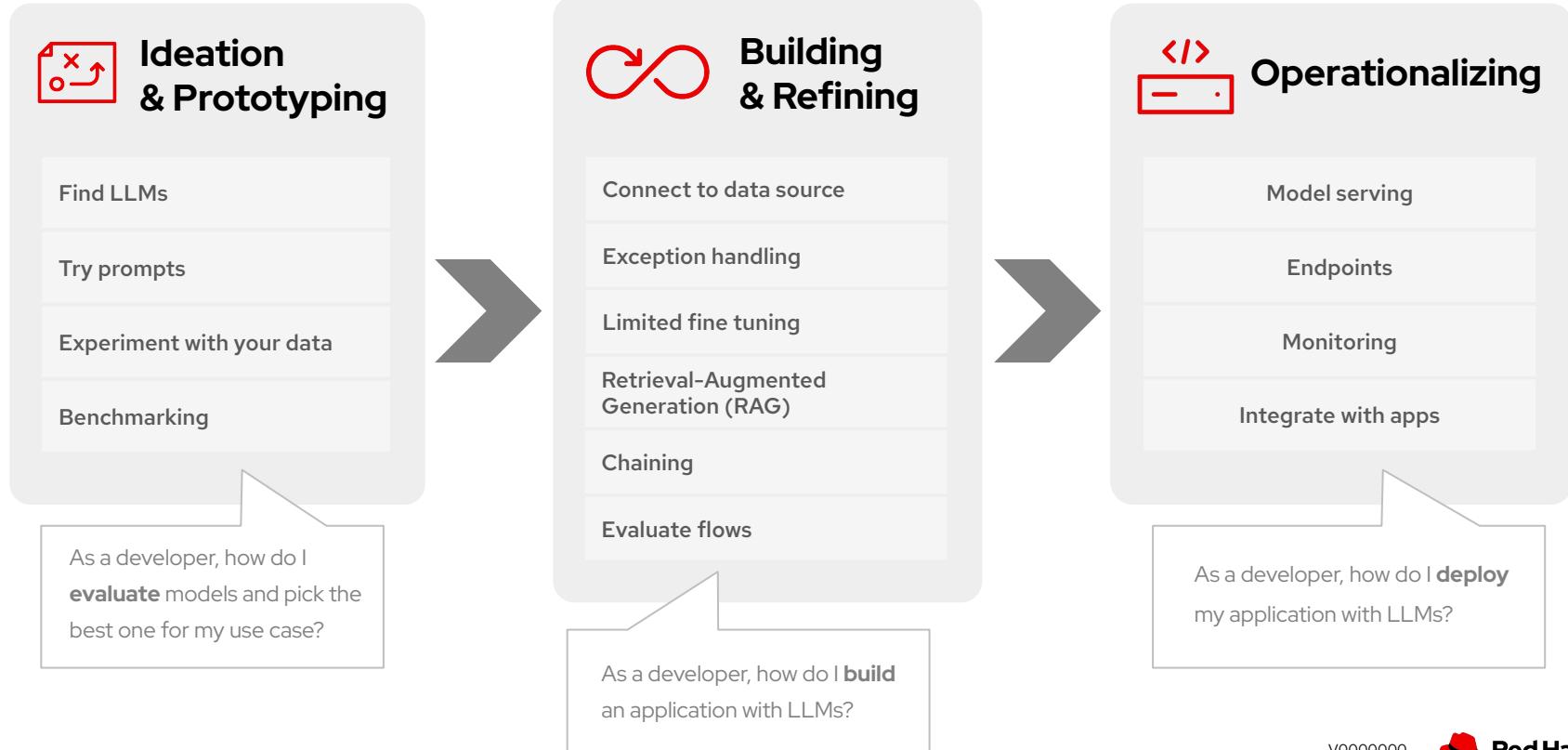


Data Ownership

Maintain ownership and control over your sensitive data from your local environment.

Adopting Generative AI for an Application Developer

CONFIDENTIAL designator



It all starts with **enabling**
the developers to use
models

Why run a model locally?

CONFIDENTIAL designator



For Developers

Convenience & Simplicity

Familiarity with the Development Environment and adherence of the developers to their “local developer experience” in particular for testing and debugging

Ease of Integration

Simplify the integration of the model with existing systems and applications that are already running locally.

Customization & Control

Easily train or fine-tune your own model, from the convenience of the developer’s local machine.

Take advantage of total AI customization and control

For Organizations



Data Privacy and Security

Data is the fuel for AI, and a differentiator factor (quality, quantity, qualification)
Keeping data on-premises ensures sensitive information doesn’t leave the local environment → crucial for privacy-sensitive applications

Cost Control

While there is an initial investment in hardware and setup, running locally can potentially reduce ongoing costs of cloud computing services and alleviate the vendor-locking played by Amazon, MSFT, Google

Regulatory Compliance

Some industries have strict regulations about where and how data is processed

Introducing: Podman AI Lab

Your developer environment for working with GenAI

Discover GenAI

- Get inspired by AI use cases
- Learn how to integrate AI in an optimal way
- Experiment with different compatible Models

Model Catalog

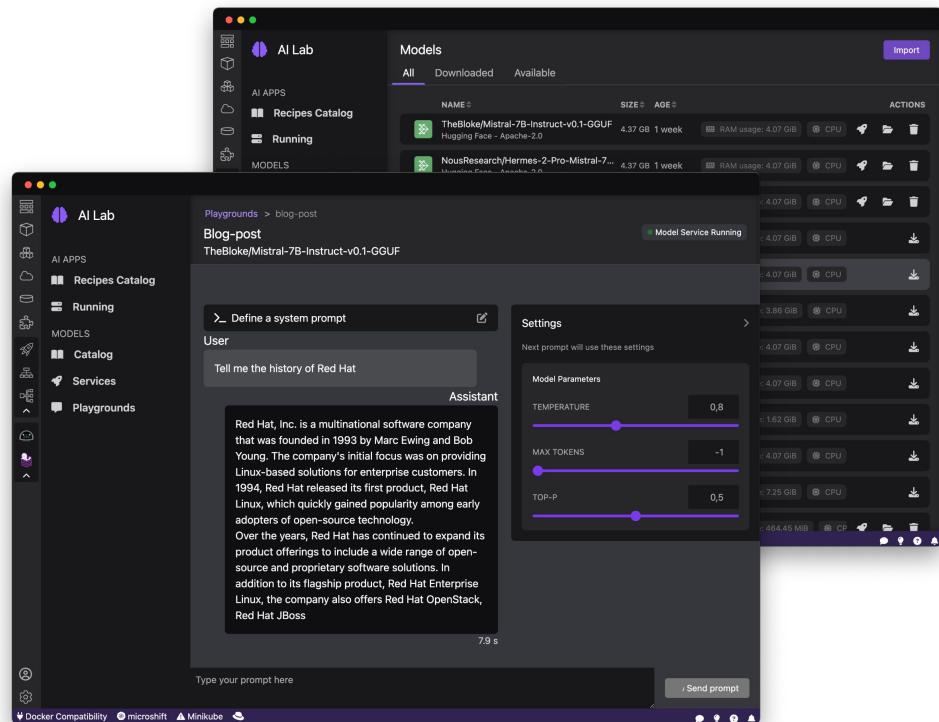
- Leverage a curated list of open source large language models available out of the box
- Import your own models

Run Models Locally

- Run models with an inference server running in UBI image
- Get OpenAI compatible API
- Use code snippets

Playground Environment

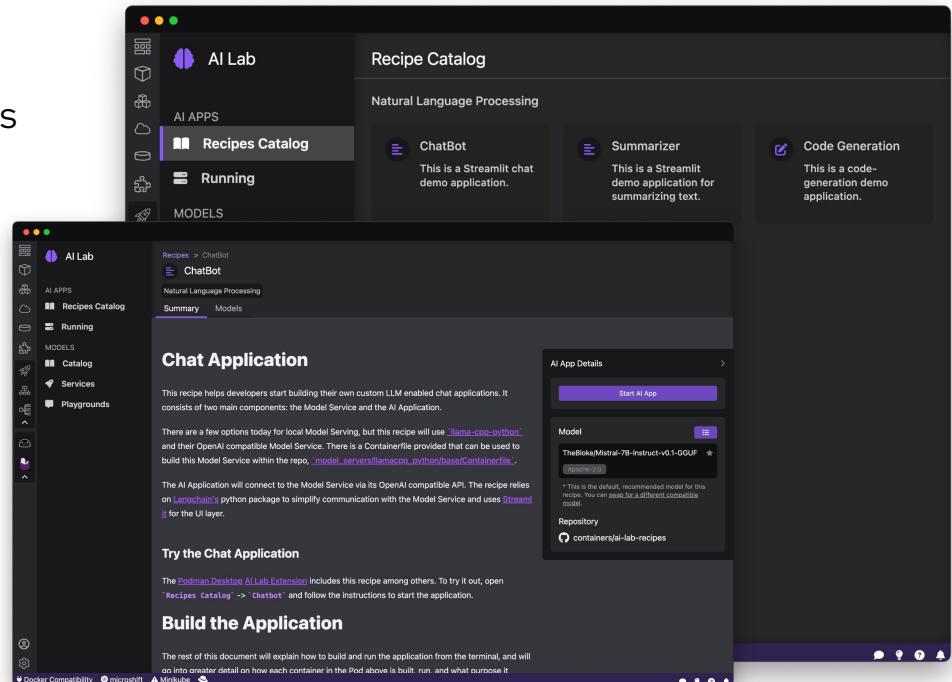
- Experiment with models and prompts
- Configure settings and system prompts
- Test and validate prompt workflows before using in your application



GenAI Recipes

Get inspiration from what GenAI can help accomplish

- ▶ A list of recipes and categories of AI use cases
- ▶ Guide users to integrate apps with LLMs
- ▶ Ready-to hack in a local environment
- ▶ Experiment with different Models
- ▶ Illustrate how to deploy to production e.g.
Kubernetes/OpenShift

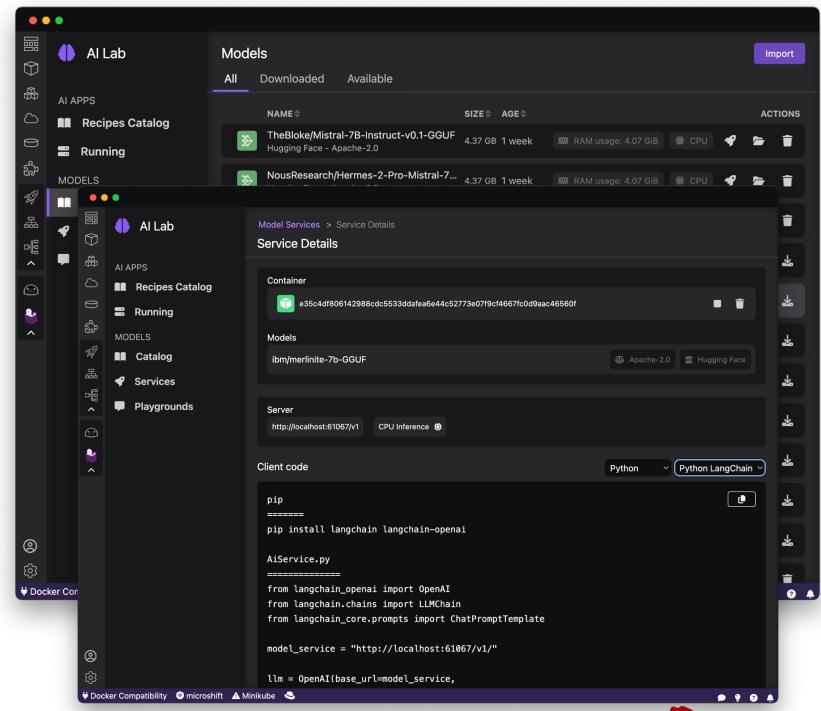


V0000000

Model Catalog

Run Model Locally and Start infusing AI in your own App

- ▶ Built in list of curated lightweight and quantized open source Models
- ▶ Clear information to licenses used
- ▶ **Model Serving with Open AI compatible API**
- ▶ Bring and run your own model (GGUF)
- ▶ Generate Code Snippet, for different languages and frameworks

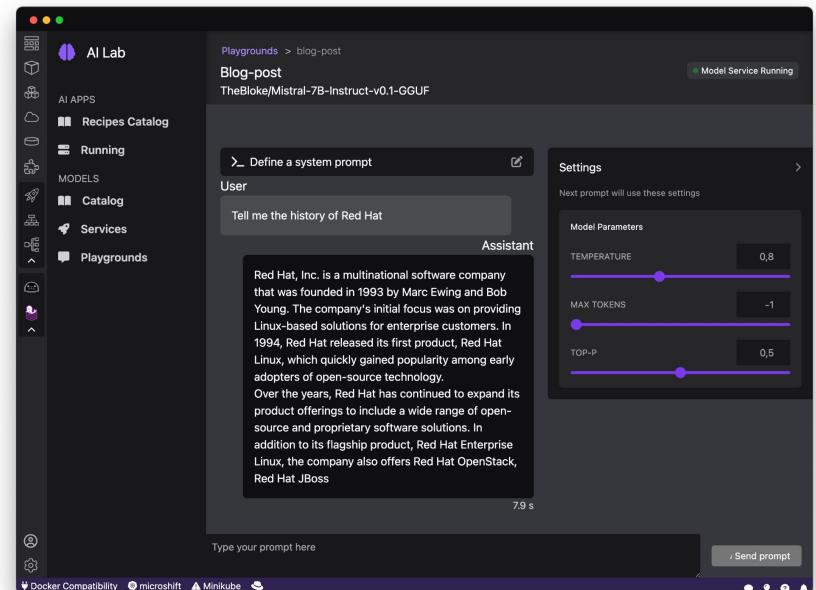


V0000000

Playground Environments

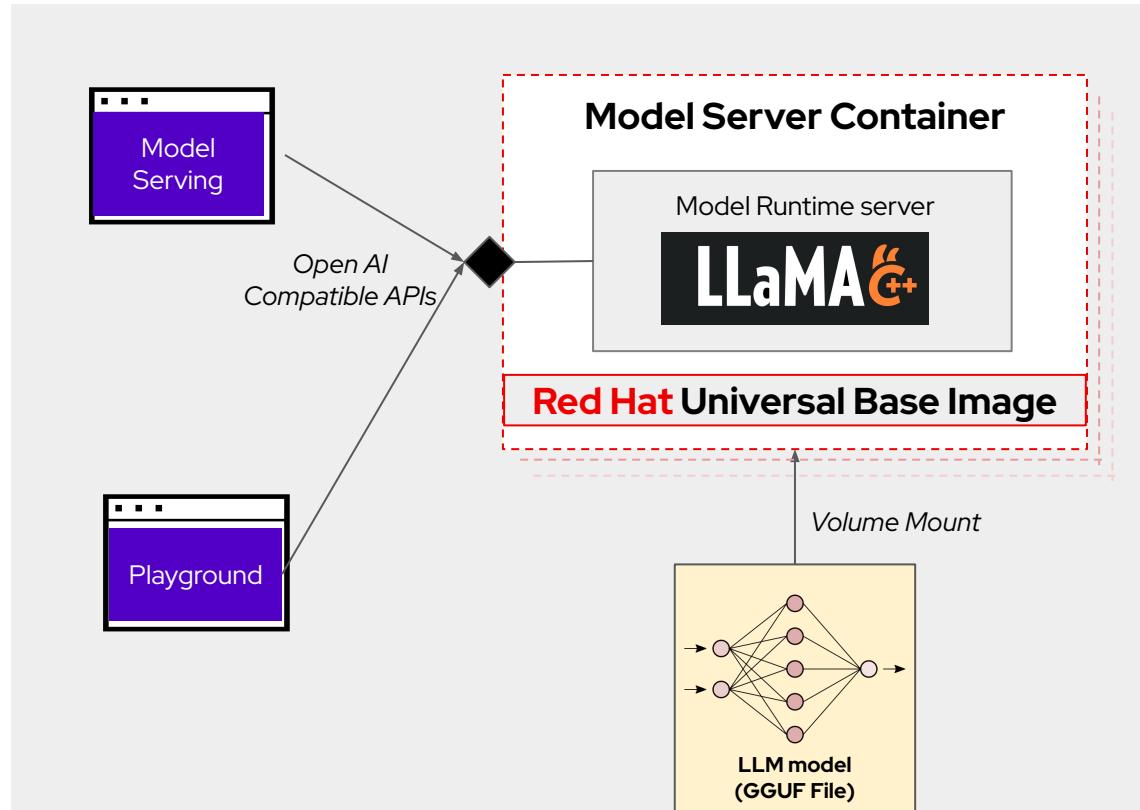
Easily experiment and customize interactions with Models

- ▶ Create multiple playgrounds environments to experiment with Models
- ▶ Evaluate, test and compare Models
- ▶ Customize Prompts and fine-tune parameters (temperature, max tokens, top-k)
- ▶ Define System Prompt for conversational context
- ▶ Generate Code Snippets for your application



Enabling Model Serving and Playground Environments

- ▶ Built on top of llama.cpp
- ▶ Container built with UBI
 - Maintained by Red Hat
- ▶ Performances and GPU acceleration
 - In progress on Windows, Linux
 - In progress Mac

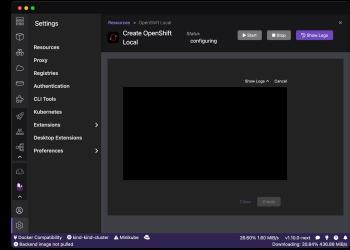


Targeting OpenShift



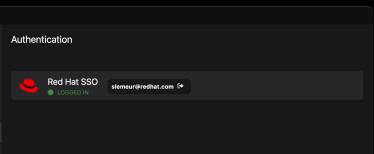
Red Hat Extension Pack

Red Hat Technologies, available locally, at your fingertips!



OpenShift Local

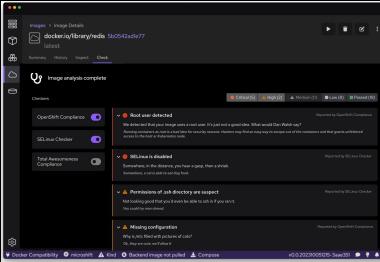
Spin up and manage local OpenShift cluster from Podman Desktop.



Red Hat SSO

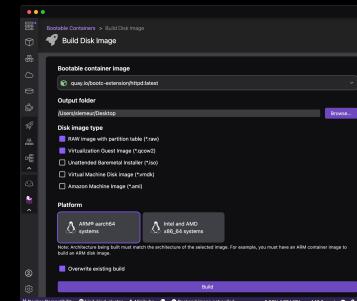
Authenticate to Red Hat and access to latest Red Hat content.

Supported platforms:



OpenShift Image Checker

Check and validate the readiness of your image for against OpenShift best practices.



Bootable Containers

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

Download now at:

podman-desktop.io



Red Hat SSO

Red Hat Developer Subscription at your Fingertips!

A screenshot of a dark-themed application interface, likely a desktop environment or a container management tool. The sidebar on the left contains the following menu items:

- Settings
- Resources
- Proxy
- Registries
- Authentication** (selected)
- CLI Tools
- Kubernetes
- Extensions
- Desktop Extensions
- Preferences

The main content area is titled "Authentication". It features the Red Hat SSO logo and the text "LOGGED OUT". There is a purple "Sign in" button with a white arrow icon. At the bottom of the main window, there are icons for Docker Compatibility, version v1.9.0, and several notification or status indicators.

Sign-up and & Sign-in to Red Hat

Social login via Google, Microsoft and GitHub.

Seamless integration

Automatically logs into the Red Hat Container Registry.

Automatically registers Linux VM via subscription Manager.

Access to Red Hat technologies

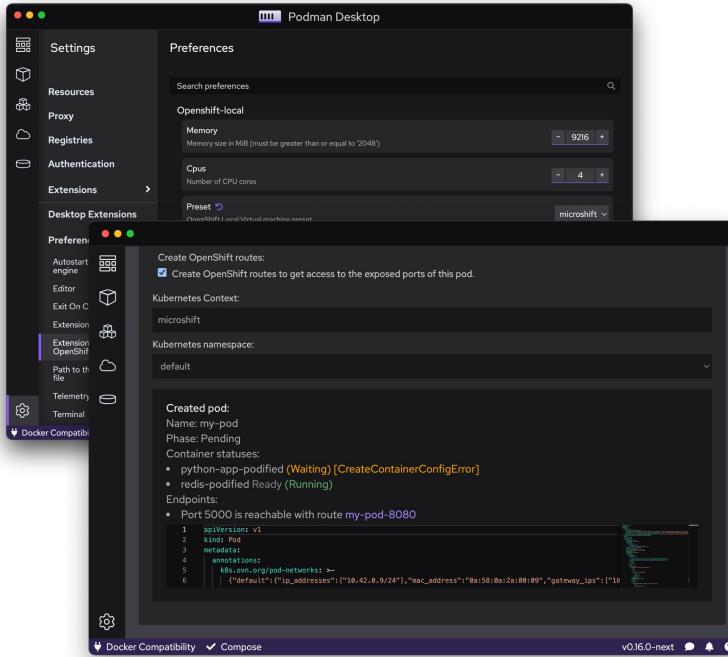
Consuming RHEL images, RPM packages, OpenShift Local and Developer Sandbox.

Developer Subscription

No-cost offering of the [Red Hat Developer program](#).

OpenShift Local

Spin up and manage local OpenShift clusters from Podman Desktop



Setup

Download and install OpenShift Local on your local environment. Manage Pull Secret.

Manage

Easily spin up **OpenShift Local** or **Microshift** clusters. Configure Memory, CPUs, Disksize.

Deploy

Easily push your containers to OpenShift Local, managed flows to deploy to Kubernetes.

Inspect

Browse and inspect your deployed resources from the Kubernetes UI of Podman Desktop.

OpenShift Image Checker

Validate your Images for readiness and compatibility with OpenShift

Image Analysis

Check image validity against OpenShift prerequisites and best practices.

Guided recommendations

Provide guidance on resolution paths.

The screenshot shows the 'Image Details' view for the 'docker.io/library/redis' image. The 'Check' tab is selected. The analysis is complete, and the results are displayed under the 'Checkers' section:

- OpenShift Compliance**:
 - Root user detected** (Critical): We detected that your image uses a root user. It's just not a good idea. What would Dan Walsh say? Running containers as root is a bad idea for security reasons. Hackers may find an easy way to escape out of the containers and that grants unfettered access to the host or Kubernetes node.
- SELinux Checker**:
 - SELinux is disabled** (Informational): Somewhere, in the distance, you hear a gasp, then a shriek. Somewhere, a cat is able to eat dog food.
- Total Awesomeness Compliance**:
 - Permissions of ssh directory are suspect** (Informational): Not looking good that you'd even be able to ssh in if you ran it. You could try man chmod.
- OpenShift Compliance**:
 - Missing configuration** (Informational): Why is /etc filled with pictures of cats? Ok, they are cute, we'll allow it.

At the bottom, there are status indicators for Docker Compatibility, microshift, Kind, Backend image not pulled, Compose, and a version number v0.0.202310051215-3aae351. A Red Hat Developer logo is also present.

Bootc Images and Image Mode for RHEL

A container-native workflow for the life cycle of a system (OS and Application)



```
FROM quay.io/centos-bootc/centos-bootc

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

ADD [application]
ADD [configuration files]

RUN [config scripts]
```

Build

A bootc base image & container file is all that's needed to describe a system, applications, and dependencies. Use your existing container tools or pipelines to quickly create and test OS images.

Deploy

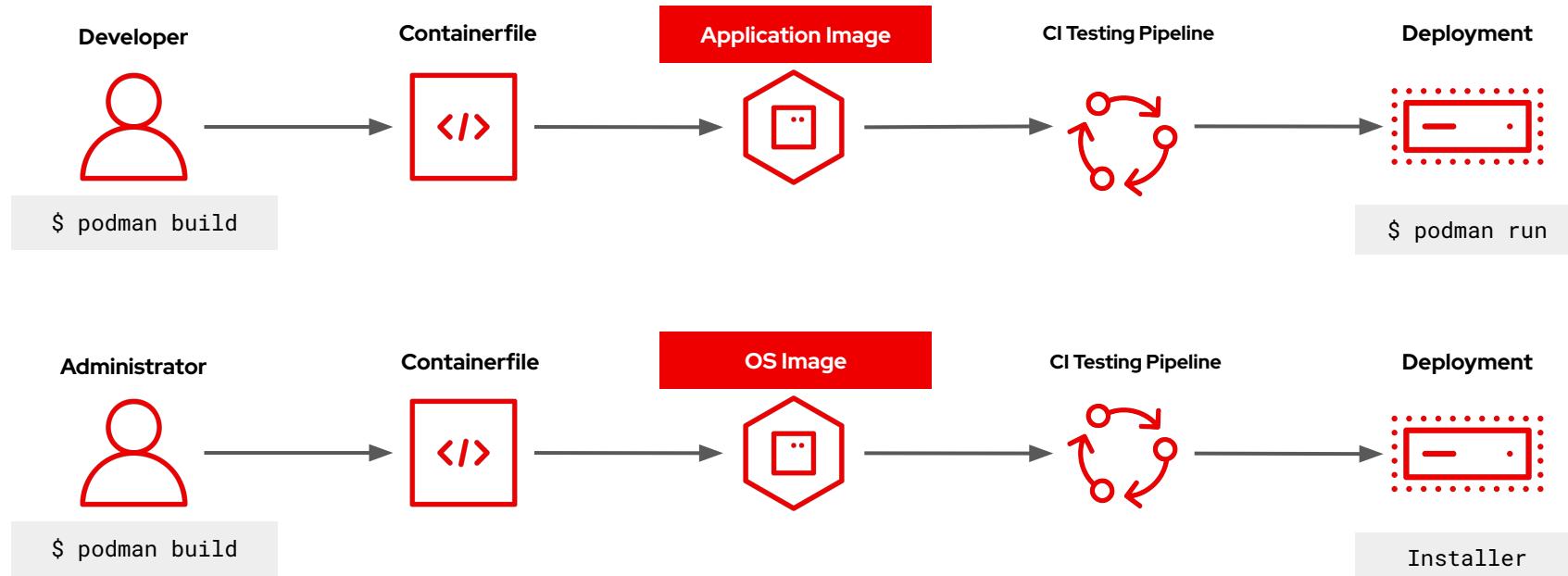
Easily convert to a VM/cloud OS image or deploy on bare metal using bootc installer.

Manage

Designed for modern GitOps & CI/CD driven environments. Systems will auto-update from the container registry by default. More advanced control and automation is available via Ansible. Intelligence via Insights and on-prem content curation via Satellite are planned for the future.

Container workflows now drive the operating system

Build, Test, Share, Deploy





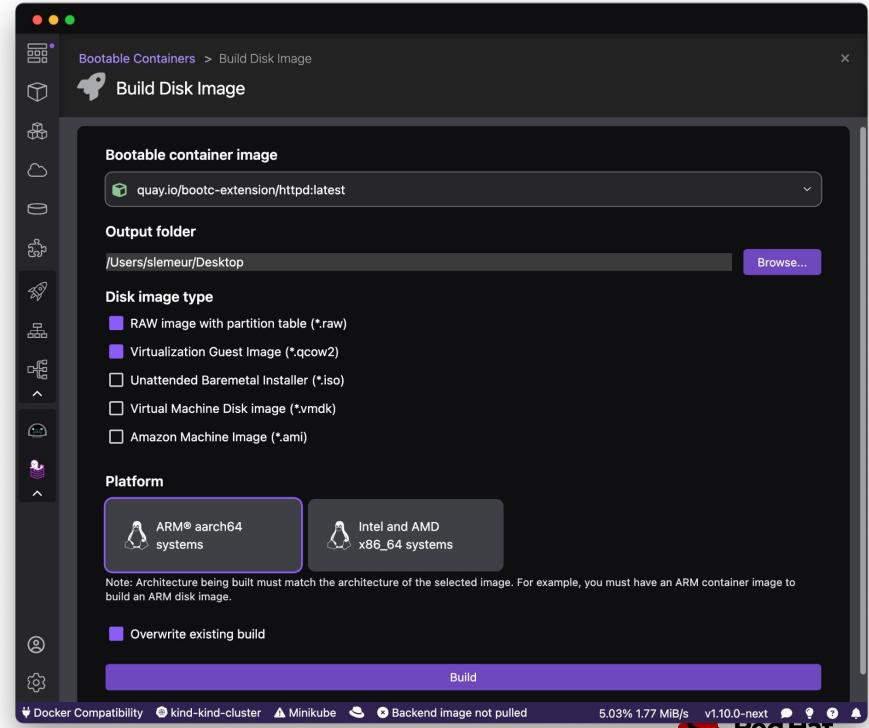
Bootc (Bootable Containers) Extension

Container workflows now drive the operating system

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

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

- ▶ Build for Intel & Arm architectures
- ▶ Easily add drivers, frameworks, or runtime libraries needed for acceleration.





podman desktop

Support Model



podman desktop

- **Podman Desktop is a community project and not an official Red Hat product**
- **Podman Desktop will get “Cooperative Community Support”* for any Red Hat customers (RHEL, including ARO, ROSA, OSD, OpenShift managed by IBM)**
 - Non-production support
 - More than community support
 - No/limited SLA - best effort ('commercially reasonable support', in legal-speak), business hours
 - Only entitled customers can use this level to open cases - namely OCP or OSD customers.
Feedback from Px working session: It would be best if the Portal interface could differentiate between 'Fully Supported Products' and 'Enhanced Community Support Offerings'
 - Will take salesforce tickets
 - Will transfer to appropriate product engineering team and open JIRA/BZs
- **Podman has supported option on RHEL**

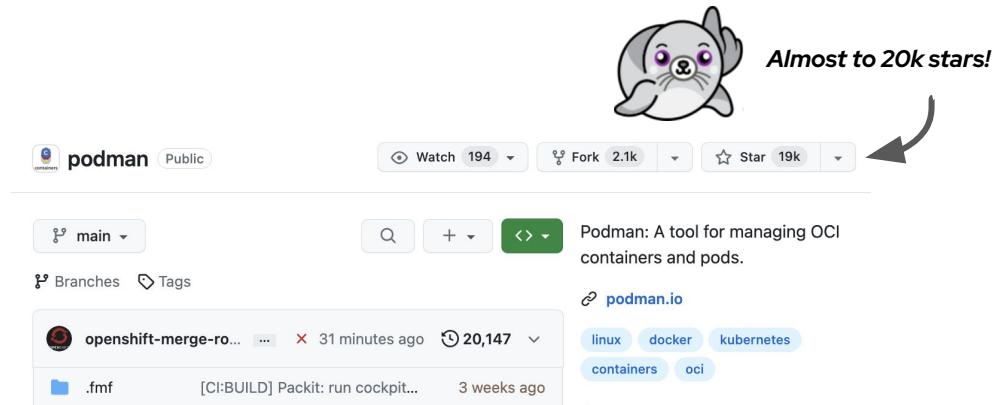
*The source link: https://source.redhat.com/groups/public/cooperative_community_support

What's next & How to get started!

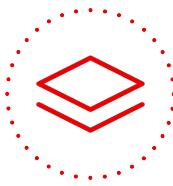
What's next for Podman?

A seamless way to work with containers (& Kubernetes!)

- ▶ Improvements for Podman Machine
 - Native Apple hypervisor support
 - Windows Hyper-V hypervisor support
- ▶ Faster container startup
- ▶ Enhancements for Podman's Kubernetes yaml support
- ▶ Better rootless networking



What's next for Podman Desktop?



Containers tooling

- Native Hypervisors support
- Onboarding experience
- Simpler Docker compatibility configuration

[Contribute](#)



Kubernetes Capabilities

- Improvements in Podify and Kubify flows
- Kubernetes Objects Explorer
- Compose to Kubernetes

[Contribute](#)



OpenShift Support

- DevSandbox account creation and token renewal flow
- Image checker
- Continue exploration on Microshift for developers



Efficient developer flows

Simple transitions to Kubernetes

Tighter OpenShift Integration

Get started with Podman & Podman Desktop!

Get involved with Podman and adopt a seal (figuratively)!



On the Web

Learn how to install Podman

podman.io

podman-desktop.io

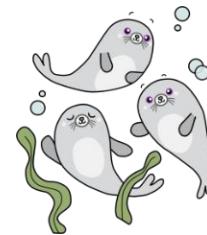


Github

Contribute and report issues

github.com/containers/podman

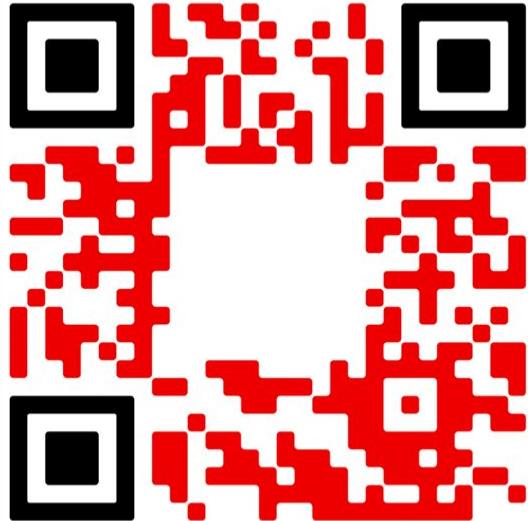
github.com/containers/podman-desktop



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