

Technical Introduction to RHEL8

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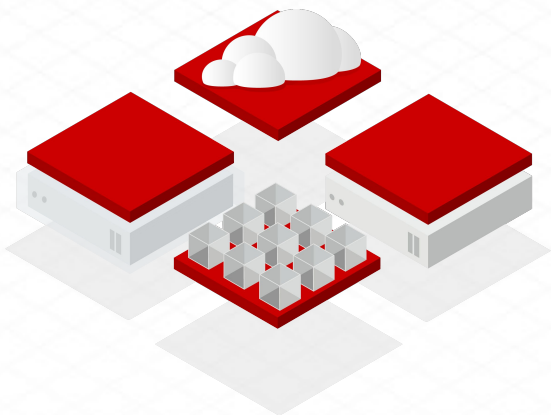
AGENDA

- What's new - Overview, Highlights
- System management with Cockpit
- What is new in package management ?
- Build your own RHEL images with Image Builder
- Container technologies : Podman, Buildah and Skopeo
- Built-in Ansible Automation with System Roles
- Centralized user session recording with System recorder (tlog)
- RHEL value-adds
- Why RHEL? Value of a Subscription

What's new?

RED HAT ENTERPRISE LINUX 8

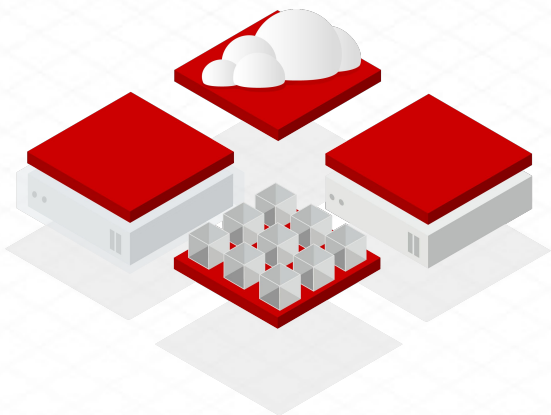
Reduce the friction and cost of change in support of service delivery readiness



- ▶ **Faster and more consistent delivery**
in any deployment footprint with full coverage native automation.
- ▶ **Best, most secure platform**
in any cloud infrastructure and for emerging workloads, like machine learning.
- ▶ **On-ramp non-linux users more quickly**
without fear of the command line.
- ▶ **The most seamless, non-disruptive migration**
process for existing Red Hat Enterprise Linux deployments.

RED HAT ENTERPRISE LINUX 8

Increase agility and reduce time to market of critical business workloads



- ▶ **Faster time to “Hello World”**
with streamlined access to high quality open source development tools.
- ▶ **Ease the transition and power the adoption of containerized workloads.**
... (details to come)
- ▶ **Best database partner**
for Oracle, SAP Hana, Microsoft SQL Server, and Postgres.

Evolution not revolution

- Reduce friction
- Increase agility

RHEL is the thing that stays the same, so everything else can change

- Gunnar Hellekson

WHAT'S NEW IN RHEL 8 ?

- Cockpit improvement
- YUM 4 , Application stream and Flatpak
- Python 3.6 (**note on Ansible, 2.8+)
- Kernel 4.18 (RHEL 7 : Kernel 3.10)
 - 5-level page table (up to 4 PB ram)
 - New tcp stack
 - Tcp bbr congestion control
- Nvdim storage support
- Containers : Podman, Buildah and Skopeo
- Composer
- System purpose
- Wayland
- Stratis
- NFS 4.2
- Leapp (in-place upgrade)
- New patches schedule

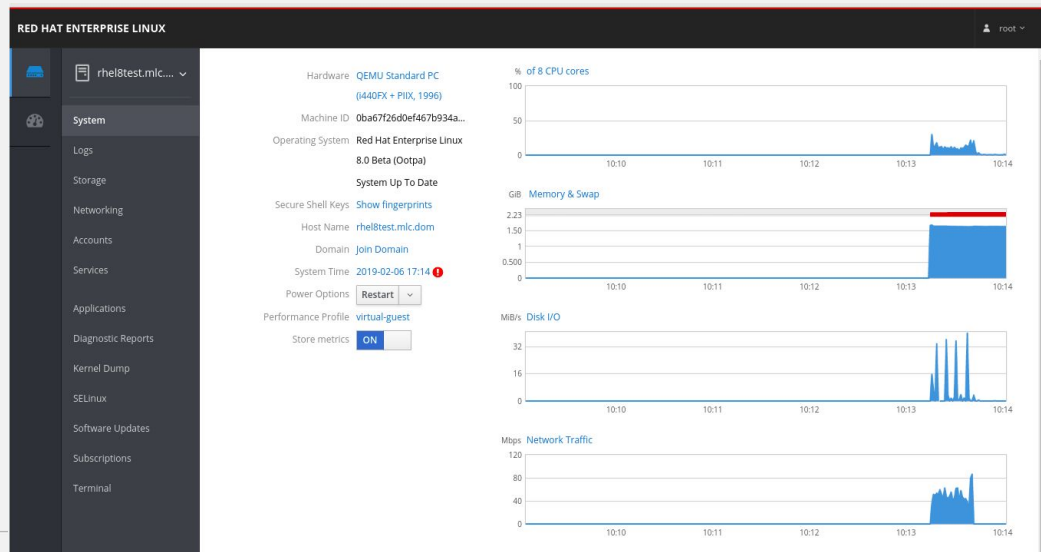
https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/8-beta/html/8.0_beta_release_notes/

System management with cockpit

COCKPIT

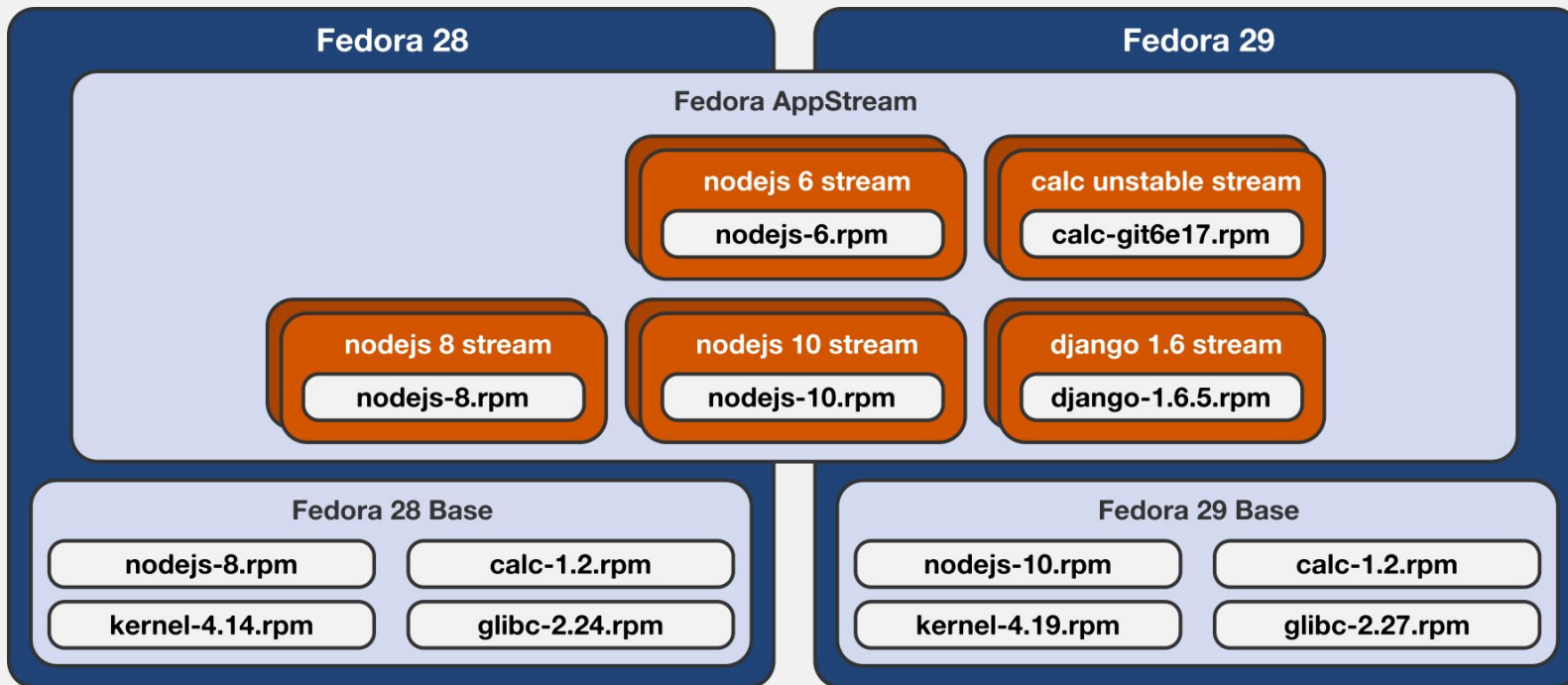
Cockpit is an interactive server admin interface (<https://cockpit-project.org/>)

- IDM - idm domain admin can manage Cockpit
- Integration with PCP to activate metric persistence !
- Manage remote server via dashboard (7.6 +)
- New Subscription manager gui
- Tlog (session recorder)
- Composer - web interface
- Virt manager replacement (8.1+)
- NBDE (8.1+)

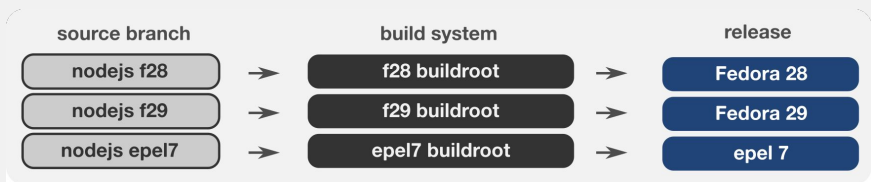


What's new in package management?

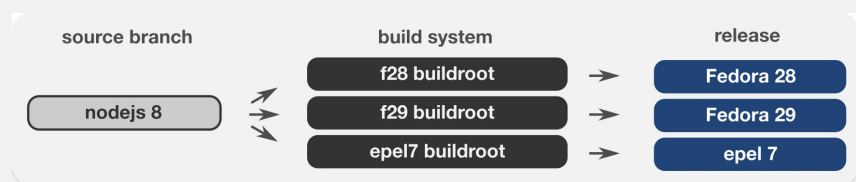
APPLICATION STREAM (Modularity)



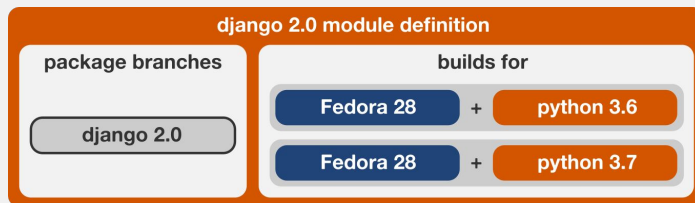
BUILDING SOFTWARE WITH MODULARITY



TRADITIONAL PACKAGE BUILDS



MODULAR PACKAGE BUILDS



BUILDING AGAINST MULTIPLE VERSIONS

APPLICATION STREAM

Provides modularity to package management

- RHEL 8 content is distributed through the two main repositories: BaseOS and Application Stream (AppStream).
 - **BaseOS**

The BaseOS repository provides the core set of the underlying OS content in the form of traditional RPM packages. Same lifecycle as RHEL 7
 - **Application Stream**

The Application Stream repository provides content with varying life cycles as both modules and traditional packages.

```
// DEMO
# yum module list
# yum module list postgresql
# yum module info postgresql
# yum module info postgresql:9.6
# yum module info postgresql:9.6 -v
# yum -y module install postgresql:9.6
# yum module list --enabled
# /usr/bin/postgresql-setup --initdb
# systemctl start postgresql
# psql --version
# yum module reset postgresql:9.6 -y
# yum -y module install postgresql:10
```

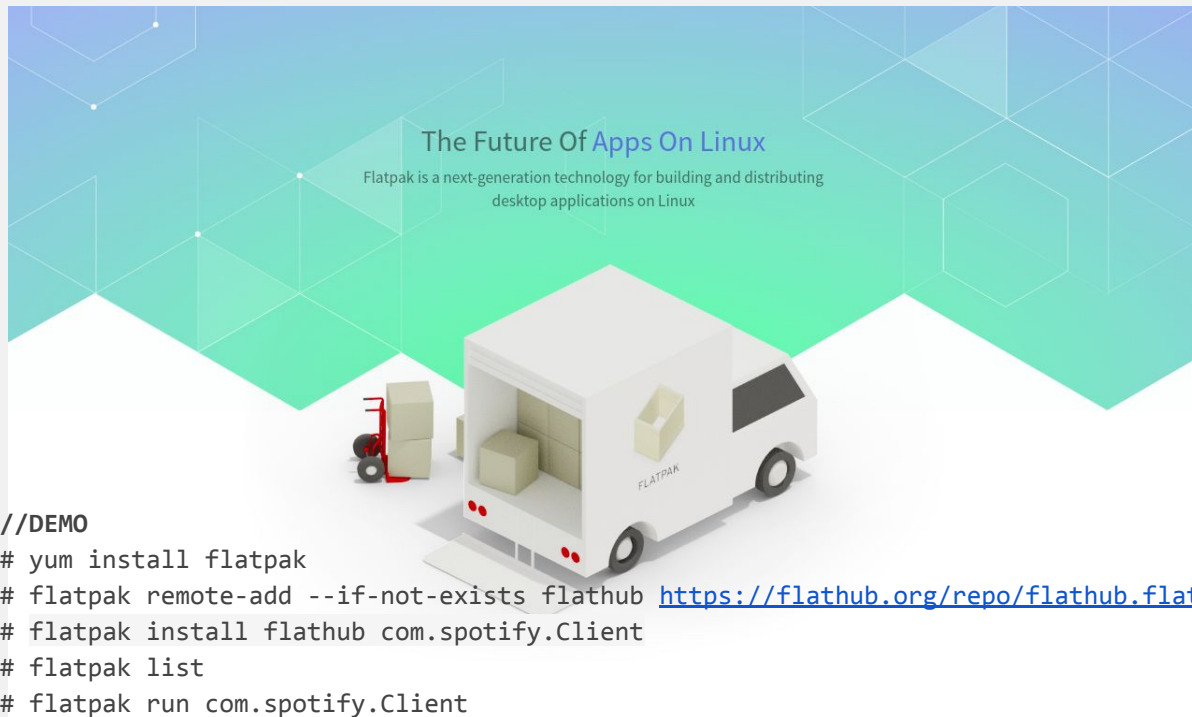
APPLICATION STREAM VS SCL

SCLs use a different method of packaging allowing for multiple versions of the same piece of software to be installed on one system, by putting them into separate namespaced paths. Modularity on the other hand uses standard RPM packaging — so things are where you expect them to be — but you can only install one version at a time.

SCLs have proven to be hard to maintain and hard to use (Special macros in spec files, package name mangling, running 'scl enable' in order to make them visible). And the ability to install multiple versions in parallel has turned out not to be a common use case. The real benefit of SCLs was the ability to choose a specific version of software — and that's exactly what Modularity offers.

FLATPAK

Flatpak is a next-generation technology for building and distributing desktop applications on Linux



The Future Of Apps On Linux

Flatpak is a next-generation technology for building and distributing desktop applications on Linux

```
//DEMO
# yum install flatpak
# flatpak remote-add --if-not-exists flathub https://flathub.org/repo/flathub.flatpakrepo
# flatpak install flathub com.spotify.Client
# flatpak list
# flatpak run com.spotify.Client
```

Build your own RHEL images with image builder

IMAGE BUILDER

<https://weldr.io/>

- Image Builder is a tool that enables users to create customized system images of Red Hat Enterprise Linux.
 - Amazon, Azure, .img, .iso, Openstack, qcow2, tar, and VMware
- Image Builder functionality can be accessed through a graphical user interface in Cockpit, or with a command line interface in the composer-cli tool

Ansible Playbook to setup image builder ::

<https://github.com/michaellessard/ansible-rhel8/blob/master/composer.yaml>

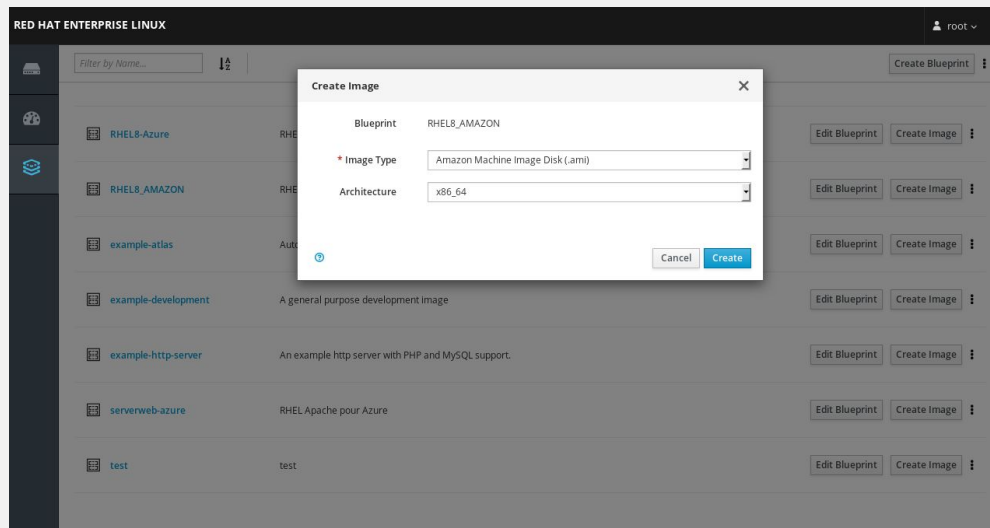
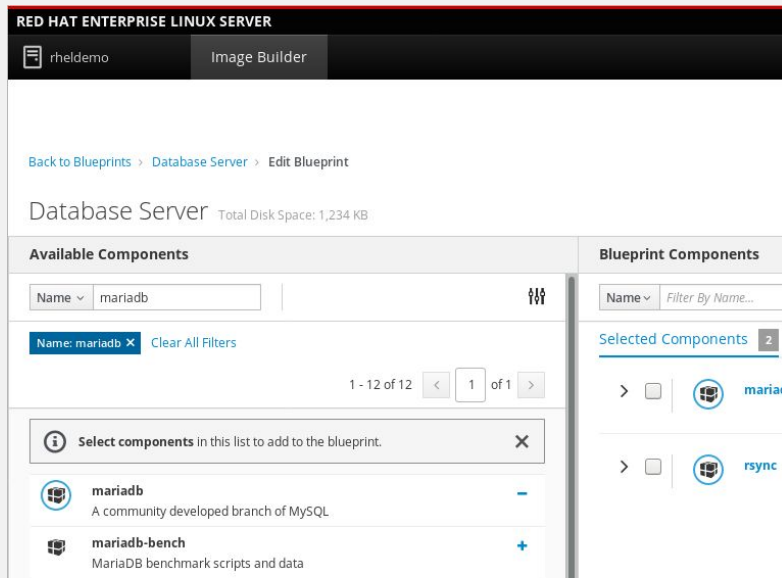


IMAGE BUILDER - (Composer)



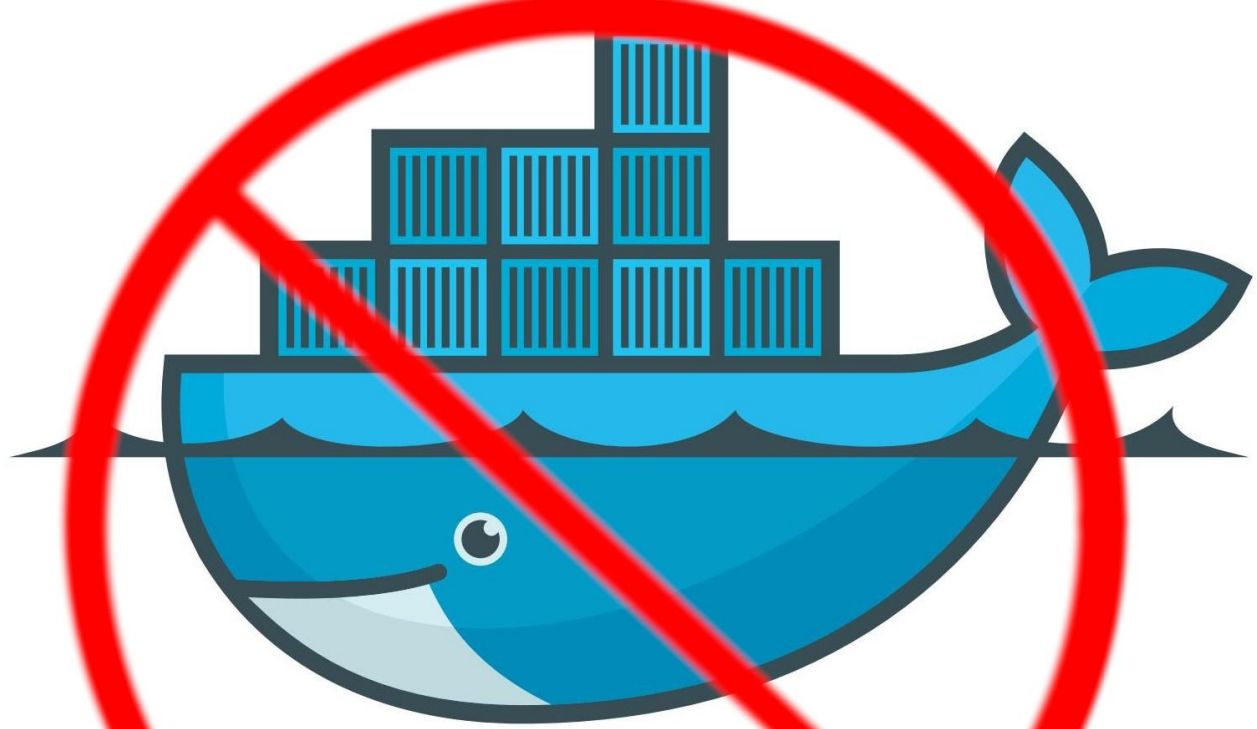
Create ISO and guest images

Improve consistency across multiple deployment footprints

Understand impacts of package addition without need for a live system

Straightforward UI

Container technologies



docker

Where is Docker ?

- In RHEL 8, no more Docker daemon
- But, you can still run/build docker images with the help of :
 - Buildah
 - Podman
 - Skopeo
- Not new in RHEL 8, but they are becoming the default container tools in RHEL 8 !

https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/8-beta/html/building_running_and_managing_containers/



buildah

<https://github.com/containers/buildah>

Build Open Container Initiative (OCI) and Docker images

- The buildah utility replaced docker build as the preferred, maintained, and supported container images build tool in Red Hat Enterprise Linux 8
- Images can be built in either the OCI image format or the traditional upstream docker image format
- No daemon !

```
//DEMO
# container=$(buildah from fedora)
# echo $container
# buildah run $container bash
# exit
# buildah run $container -- yum -y install screenfetch
# buildah run $container screenfetch
```



SKOPEO

<https://github.com/containers/skopeo>

Inspect, copy, and sign container images

- Replaces docker push as the preferred, maintained and supported utility for moving container images between registries, and container engines
- Can inspect a repository on a container registry without needlessly pulling the image.
- Can sign and verify container images
- Can delete container images from a remote container registry
- No daemon ! No root user required

```
//DEMO
$ skopeo inspect docker://docker.io/fedora
$ mkdir fedora-29
$ skopeo copy docker://fedora:29 dir:fedora-29
$ tree fedora-29
fedora-24
├── 7c91a140e7a1025c3bc3aace4c80c0d9933ac4ee24b8630a6b0b5d8b9ce6b9d4.tar
├── f9873d530588316311ac1d3d15e95487b947f5d8b560e72bdd6eb73a7831b2c4.tar
└── manifest.json

0 directories, 3 files
```



podman

<https://podman.io/>

Run, manage, and debug containers

- The podman container engine replaced docker as the preferred, maintained, and supported container runtime of choice for Red Hat Enterprise Linux 8
- Podman provides a docker compatible command line experience enabling users to find, run, build, and share containers
- Podman uses Buildah and Skopeo as libraries for the build and push
- No daemon !

```
//DEMO
# podman run -t -p 8000:80 nginx //than open a second terminal
# podman ps
# podman inspect -l | grep IPAddress\":
# curl http://<IP_address> // or with firefox
# podman logs --latest
# podman top <container_id>
# podman stop --latest
# podman ps -a
# podman rm --latest
```

Built-in Ansible automation

SYSTEM ROLES

ANSIBLE PLAYBOOKS

```
hosts: all
role: rhel-system-roles.network
```

RED HAT ENTERPRISE LINUX SYSTEM ROLES

Network	SELinux	TimeSync	kdump
Storage	Logging	Firewall	Tuned
NFS	Metrics	Identity	Boot

6

7

8.x

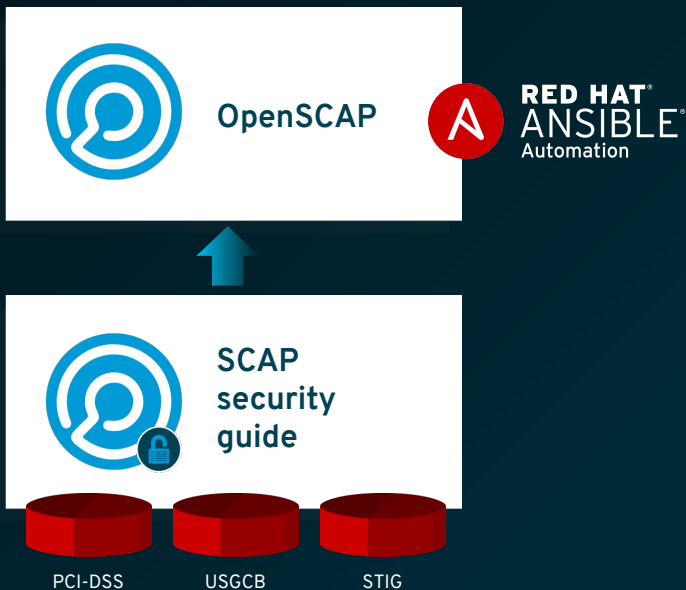
CURRENT ROLES

- Network
- Security-Enhanced Linux (SELinux)
- TimeSync
- Postfix
- kdump

TARGETED ROLES

- Storage
- Logging
- Metrics
- Network file system (NFS)
- Tuned
- Firewall

AUTOMATE SECURITY CONFIGURATIONS



- > **Define and tailor**
security policies via profiles
- > **Scan and apply**
security policies via Red Hat Ansible Automation or bash
- > **Assert security**
policy at build with Ansible Automation or Anaconda



Shipped National Checklist profiles include:

DISA STIG | PCI - DSS | NIST USGCB

System recorder - tlog

SYSTEM RECORDER - TLOG

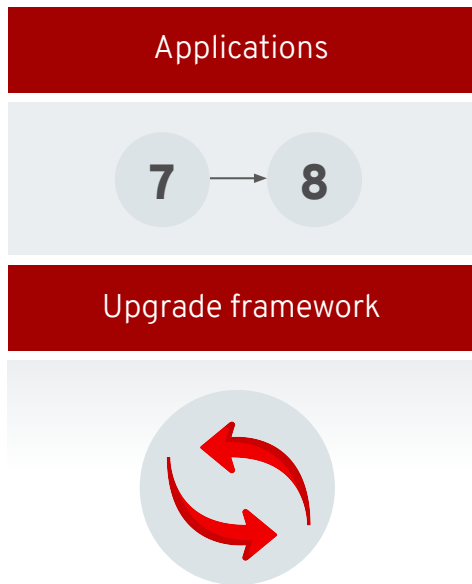
<https://github.com/Scribery/tlog>

- Tlog is a terminal I/O recording and playback package
- implementing centralized user session recording.
- It logs everything that passes through as JSON messages to a logging service.
 - The primary purpose of logging in JSON format is to eventually deliver the recorded data to a storage service such as Elasticsearch, where it can be searched and queried, and from where it can be played back. At the same time, they retain all the passed data and timing.
- Management through command line or Cockpit

```
//DEMO
# yum install cockpit-session-recording tlog
# tlog-rec --writer=journal
# usermod --shell /usr/bin/tlog-rec-session test
# ssh test@127.0.0.1
```

Extras

In-place upgrades for your systems



Reduced migrations

Analyze systems to determine if upgrading in place can avoid a costly migration

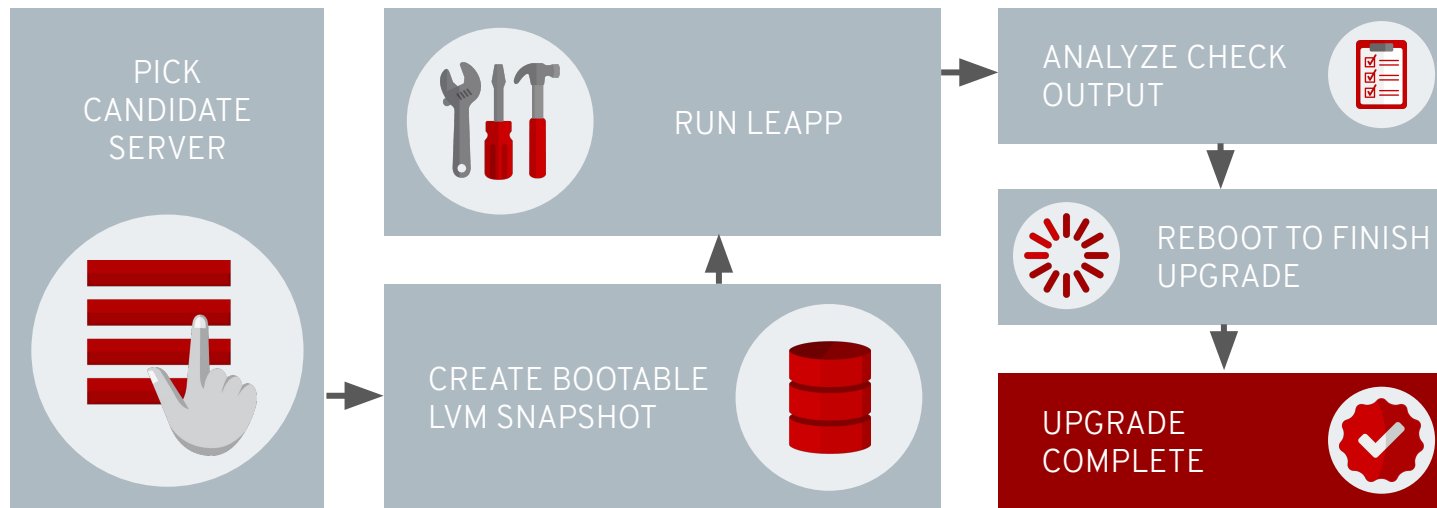
Easy rollback options

Combine with bootable LVM snapshots for safety

Improved framework

Get better analysis and a simplified process with a more extensible framework

Can I upgrade this host?



TCP BBR CONGESTION CONTROL

Developed by Google, used on GCP

During beta testing, kernel 4.18.0-1.el8.x86_64 in RHEL 8 supported close to 558.59 Kcps, a **13%** improvement over RHEL 7.6, which is able to support 496.09 Kcps.

Not enable by default, to activate it :

```
//DEMO
# sysctl net.ipv4.tcp_available_congestion_control
# vim /etc/sysctl.conf
net.core.default_qdisc=fq
net.ipv4.tcp_congestion_control=bbr
# sysctl -p
# sysctl net.ipv4.tcp_available_congestion_control
# sysctl net.ipv4.tcp_congestion_control
```

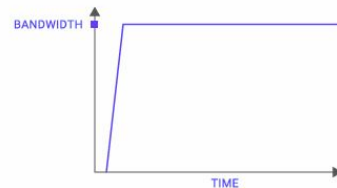
TCP before BBR

Today's Internet is not moving data as well as it should. TCP sends data at lower bandwidth because the 1980s-era algorithm assumes that packet loss means network congestion.



TCP BBR

BBR models the network to send as fast as the available bandwidth and is 2700x faster than previous TCPs on a 10Gb, 100ms link with 1% loss. BBR powers google.com, youtube.com, and apps using Google Cloud Platform services.



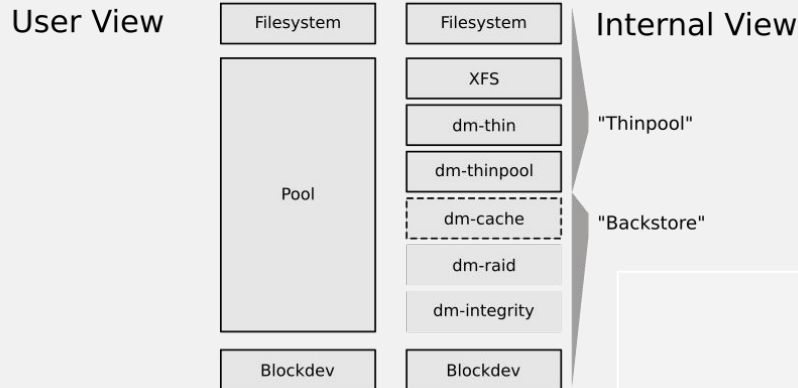
STRATIS

<https://stratis-storage.github.io>

Stratis is a Linux local storage management tool that aims to enable easy use of advanced storage features such as thin provisioning, snapshots, and pool-based management and monitoring.

```
//DEMO
# yum install stratis-cli stratisd
# systemctl start stratisd
# startis pool create mypool /dev/sdb
# stratis fs create mypool myfs1
# mkdir /mnt/strat1
# mount /stratis/mypool/myfs1 /mnt/strat1
# mount | grep mnt // XFS default filesystem
```

Stratis Layers



RHEL Value Adds

SIMPLIFIED PRICING AND PACKAGING

Get the most out of your Red Hat infrastructure investment

OLD MODEL

RED HAT® SATELLITE

Purchase each of the following:

- Red Hat Satellite Server
- Red Hat Satellite Capsule Server
- Smart Management Add-On

RED HAT® INSIGHTS

Purchase the following separately:

- Red Hat Insights Add-On

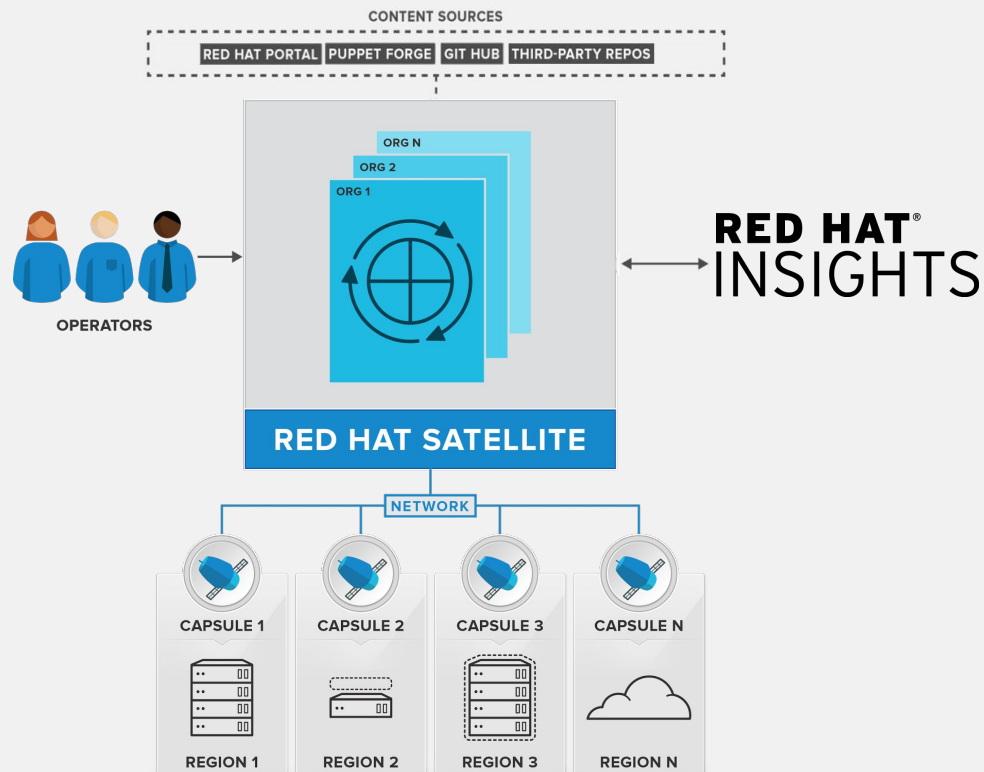
NEW MODEL

LAUNCHED MARCH 1 2018

RED HAT®
SATELLITE + **RED HAT®**
INSIGHTS

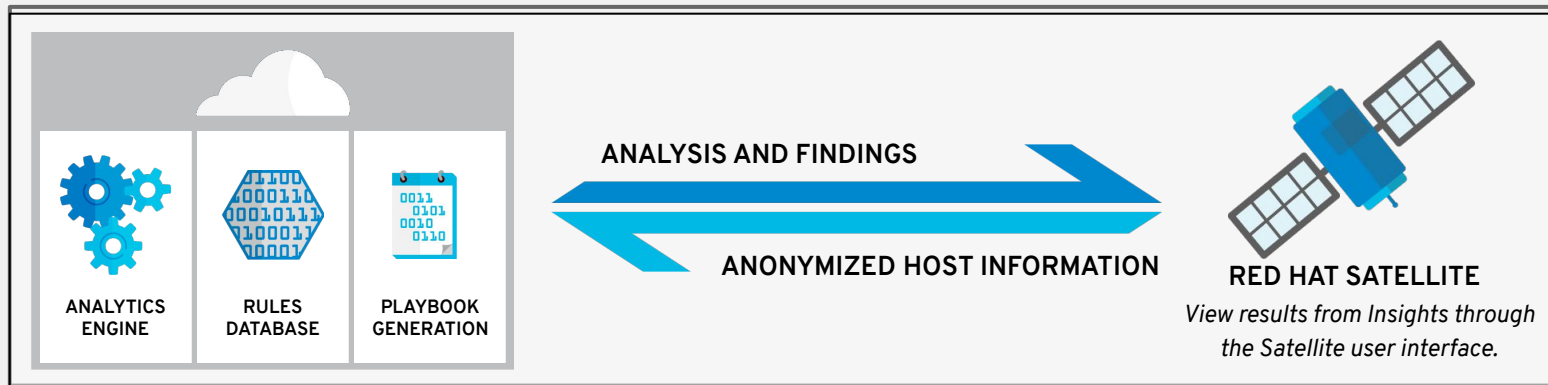
Receive all Satellite and Insights elements (servers & clients) with the purchase of **Smart Management**

SATELLITE 6 DEPLOYMENT



WHY USE INSIGHTS WITH SATELLITE?

Stop reacting to problems once they occur. Predict & fix them now.



ACTIONABLE INTELLIGENCE POWERED BY RED HAT

Confidently scale complex environments.



CONTINUOUS VULNERABILITY ALERTS

Maximize uptime and avoid fire-fighting.



INCREASED VISIBILITY TO SECURITY RISKS

Get ahead of security risks and fix them before it's a problem.



AUTOMATED REMEDIATION

Minimize human error, do more with less, and fix things faster.

SATELLITE + INSIGHTS CAPABILITIES

Getting more from the purchase of Smart Management

CATEGORIES	CAPABILITIES	SATELLITE	INSIGHTS
Red Hat subscription management	Subscription knowledge and control	✓	
Provisioning	Bare-metal, VM, & cloud	✓	
	System discovery	✓	
Security & compliance	Automated remediation		✓
	Predictive IT analytics		✓
	Risk assessment		✓
	SCAP operations	✓	
Configuration management	System configuration	✓	
	Drift management	✓	
Software management	Content repository	✓	
	Patch management	✓	



RED HAT DEVELOPER SUBSCRIPTION

The Red Hat Developer program provides a number of benefits, including a no-cost Red Hat Developer Subscription which allows access to products offered through the program for use in a development environment.

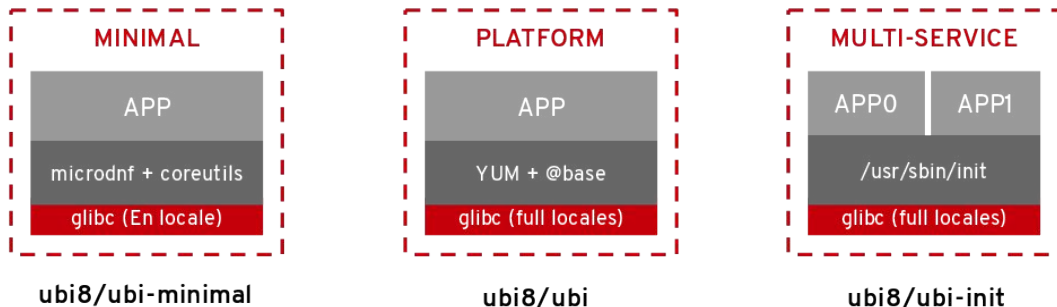
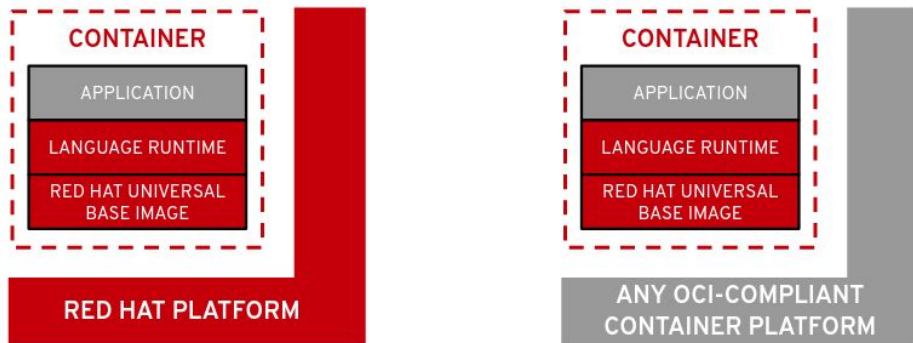
<https://developers.redhat.com/register>

<https://developers.redhat.com/products>

FREE RHEL!!

Features	Guest	Program Member
Developer blogs, tutorials, how-tos	Yes	Yes
Browse Red Hat Developer program forums	Yes	Yes
Browse Red Hat tagged Stack Overflow questions	Yes	Yes
No-cost Red Hat Developer Subscription, the full Red Hat product portfolio for developers	-	Yes
Access to the full Red Hat Customer Portal knowledgebase	-	Yes
Members-only bonus material (books, cheat sheets, webinars, sample code, etc.)	-	Yes

Containers: Universal base image



Reasons to use UBI

- My **developers** want a container image they can distribute more broadly
- My **operations** team wants a supportable base image with an enterprise lifecycle
- My **architects** want to deliver a Kubernetes Operator to my customers
- My **customers** want enterprise support in their Red Hat environment
- My **community** wants to share containerized applications more freely
- My **security** team wants to take advantage of an enterprise linux supply chain

Why RHEL?

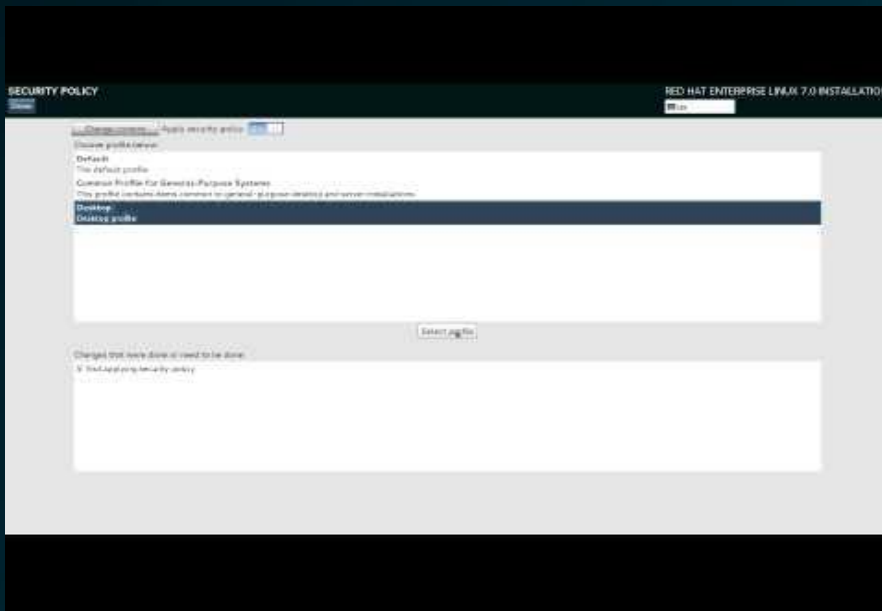
The value of a subscription

WHY RHEL?

- ★ Linux still seeing enormous growth
- ★ RHEL runs EVERYWHERE. On-prem, private & public cloud, embedded, x86, ARM, POWER. Broadest ecosystem, and its certified.
- ★ Free linux is attractive until a compelling event
- ★ Open source innovation model has taken over software development
- ★ Red Hat commitment to security, API compatibility, legal indemnification, QA'd bits
- ★ Only linux that has predictive analytics and remediation engine built-in
- ★ DIY - how much does this cost you? Are you bringing the business value?
- ★ Training, and Support.

One more thing...

OPENS CAP ANACONDA INTEGRATION



- OpenSCAP is also integrated with the Anaconda installed
- Anaconda can apply various settings detailed in a Profile from a Security Guide that is fetched via http and will enforce it before the first boot
- This can be automated also via kickstart

BOOM BOOT MANAGER



- › Boom is a boot manager that works with grub2 for RHEL that supports booting from snapshot images like those created on LVM.
- › Boom allows for the management and creation of these snapshot images. These bootable snapshots have many applications, including providing a roll back option for system or application updates.

APPSTREAM AND MODULES



APPLICATION STREAM

- Application Stream aims to be a platform for Red Hat to rapidly introduce changes in RHEL content in response to evolving customers needs, without risking stability customers have come to expect from RHEL.

MODULES

- Modules offer flexibility in packaging, giving a means to deliver on Application Stream's goals.

COMPOSER



SYSTEMS/CLOUD ADMINISTRATOR

"I need to quickly create customized OS images for all of my hybrid deployment environments, including physical, virtual, private, and public clouds."

- > **Create** custom blueprints
- > **Target** any platform:



STRATIS PROJECT (v1.0)



An integrated, volume-managing file system

- > Easy-to-Use
- > Automates Best Practices
- > Reduces complexity

XFS COPY-ON-WRITE DATA EXTENTS



- XFS reflinks allow admins to do directory level snapshots
- Easy tool for failure recovery, especially when troubleshooting
- Each copy has its own inode so can have different metadata. Only the data extents are shared.

SESSION RECORDING



- tlog is a terminal I/O recording and playback package suitable for implementing centralized user session recording.
- The primary purpose of logging in JSON format is to eventually deliver the recorded data to a storage service where it can be searched and queried, and from where it can be played back.

:: RHEL 8 VIDEO SERIES:

<https://www.youtube.com/playlist?list=PLCBAA45EFAC73B877>

RHEL8 DEMO PLAYBOOK:

<https://github.com/aludwar/ansible/blob/master/rhel8.demo.yml>

Thank you

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