CHOOSING THE RIGHT CONTAINER BASE IMAGE

For your applications

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05/07/2019

Red Hat Summit 2019
WHAT IS A BASE IMAGE?
WHAT IS A CONTAINER IMAGE?

Let’s start with a traditional operating system

- **Libraries** - Compile once, update once, everyone gets benefits
- **Binaries** - Leverages libraries because requires SME knowledge I don’t have to
- **Packages** - Put this logic in packages so that I don’t have to know it
WHAT IS A CONTAINER IMAGE?
We started containers by putting these same components in container images

Dependencies
- **Libraries** - Compile once, update once, everyone gets benefits
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- **OCI Container Images** - Tar files full of packages and JSON metadata
WHAT IS A CONTAINER IMAGE?

We started containers by putting these same components in container images

Dependencies

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WHAT IS A CONTAINER IMAGE?

Side by side comparison

Benefits/Drawbacks

- **Libraries** - every binary inherits changes
- **Binaries** - dynamically inherit changes
- **Packages** - SME knowledge offloaded to specialist
- **OCI Container Images** - Easy to deploy with single command
DO LINUX DISTRIBUTIONS STILL MATTER?
With containers?

Short Answer
• Yes

Longer Answer
• Container Image: You are still using in binaries that are compiled - even JVMs, Python, Ruby, Node.js, etc
• Interaction with Container Host: Performance, security and testing - regressions, extra resources used, unknown CVEs (yes, this can happen)

See Also
• https://opensource.com/article/19/2/linux-distributions-still-matter-containers
KEY QUESTIONS IN SELECTING A BASE IMAGE
QUESTION #1
Do I even need a base image?

Some Options
- YUM - just pull the packages you need in a multi-stage build
- Distroless - some programming languages compiled
- Scratch - literally nothing, just a scratch image

Reality
- You are likely pulling in pre-built packages
- You are compiling everything yourself
- When things break, it’s a developer action, not an operations action
QUESTION #2
How do I guarantee performance in production?

Works on my laptop

But, what about at 1M transactions per second

CONTAINER
APP
LANGUAGE RUNTIMES
GENERIC CONTAINER IMAGE
LAPTOP

CONTAINER
APP
LANGUAGE RUNTIMES
GENERIC CONTAINER IMAGE
PRODUCTION

1M TPS
QUESTION #3
How do I guarantee security in production?

Works on my laptop

What about hackers?
QUESTION #3
Can I redistribute my application how I want?

CONTAINER
ISV APP
LANGUAGE RUNTIMES
OS
(USER SPACE)

Joint Red Hat Customer
Only ISV Customer
Joint Red Hat Customer
Only ISV Customer
QUESTION #5
What else am I not thinking about?

**Architecture**
- C Library
- Core Utilities
- Size
- Life Cycle
- Compatibility
- Troubleshooting
- Technical Support
- ISV Support
- Distributability

**Security**
- Updates
- Tracking
- Security Response Team

**Performance**
- Automated
- Performance Engineering
INTRODUCING THE RED HAT
UNIVERSAL BASE IMAGE
THE RED HAT UNIVERSAL BASE IMAGE

The purpose is...

“To be the highest quality and most flexible base container image available”
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 footprint (~90 to ~200MB)
- Programming languages (Modularity & AppStreams)
- 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
THE BASE IMAGE FOR ALL OF YOUR NEEDS

Engineered by Red Hat with an enterprise roadmap, security and performance

Trusted:

- Libraries
- Packaging format
- Core Utilities
- Security Response
- Patching
- Performance Response
- Technical Support
- More
WHAT IS THE RED HAT UNIVERSAL BASE IMAGE?

Three base images, language runtime images, and software packages

Base Images

Pre-Built Language Images

Package Subset

STANDARD

MINIMAL

MULTI SERVICE

Node.js

ALL RED HAT ENTERPRISE LINUX PACKAGES

UNIVERSAL BASE IMAGE PACKAGES
THE BASE IMAGE FOR ALL OF YOUR NEEDS

Bringing the value of RHEL to cloud native applications

Traditional Applications

Containerized Applications

Cloud Native Applications
WHAT IS THE RED HAT UNIVERSAL BASE IMAGE?

Providing the right level of content for application stability via the RHEL API/ABI

MINIMAL

**APP**
- microdnf + coreutils
- glibc (En locale)

ubi8/ubi-minimal
Designed for applications that contain all dependencies (Golang, dotnet, etc)
- Minimized content set
- No suid binaries
- Minimal package manager (install, update, remove)

PLATFORM

**APP**
- YUM + @base
- glibc (full locales)

ubi8/ubi
For any application that runs on RHEL
- Unified, openssl crypto stack
- Full YUM stack
- Includes useful basic OS tools (tar, gzip, vi, etc)

MULTI-SERVICE

**APP0**
- /usr/sbin/init

**APP1**
- glibc (full locales)

ubi8/ubi-init
Eases running multiple services in a single container
- Configured to run systemd on start
- Simply enable the services at build time
CAN BE BUILT & DEPLOYED ANYWHERE
Building on UBI is the first step

Certification provides the highest level of support
Enterprise support when run on Red Hat platforms
Trusted base for any environment
TWO WAYS TO GET UPDATES

Red Hat provides updated base images & RPM updates so you can rebuild any time you want.
SAME BITS USED IN MISSION CRITICAL WORKLOADS

It goes beyond works on my laptop
# Levels of Supportability

<table>
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<th>Service</th>
<th>Anywhere</th>
<th>+Red Hat Platform</th>
<th>+Certification</th>
<th>+Operator Certification</th>
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<td>Proven Images</td>
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SUPPORTABILITY MATRIX
Tiered support model

Red Hat Enterprise Linux 7
RHEL 6
UBI 7
UBI 8
OTHER

Red Hat Enterprise Linux 8
RHEL 6
UBI 7
UBI 8
OTHER

ANY CONTAINER PLATFORM
RHEL 6
UBI 7
UBI 8
OTHER

Like any upstream project

RHEL 8

Like any upstream project
WITH A CERTIFIED APPLICATION CONTAINER

Collaborative support with Red Hat and ISV to resolve any issue, request patches, etc
WHEN DEPLOYED ON RED HAT PLATFORM

Red Hat Universal Base & RHEL packages when registered

Updates
WHEN DEPLOYED ON RED HAT PLATFORM

Call Red Hat Support to resolve any issue, request patches, etc
WHEN DEPLOYED ON ANY CONTAINER PLATFORM

Red Hat Universal Base Image package updates from anywhere
CERTIFICATION & OPERATORS
THE BASE IMAGE FOR ALL OF YOUR NEEDS

Bringing the value of RHEL to cloud native applications

- RHEL
  - APP
  - LANGUAGE RUNTIMES
  - KERNEL & SYSTEM SOFTWARE

- CONTAINER
  - APP
  - LANGUAGE RUNTIMES
  - SYSTEM SOFTWARE

- OPERATOR
- WEB SERVICE
- DATABASE
- CACHE TIER

Certified Traditional Application
Certified Containerized Applications
Certified Cloud Native Applications
BEHIND THE SCENES
There is a lot more than might be suspected

Process:
- Build
- Validate
- Publish
- List
- Grade
- Rebuild
BEHIND THE SCENES

- Ongoing delivery of security patches
- Ongoing validation of interoperability
- Ongoing validation of supportability

NEW PRODUCT

RED HAT
Universal Base Image

Build With

Validate

List

Grade

Red Hat
CONTAINER CERTIFICATION

AUTO-BUILD*

AUTO-PUBLISH*

RED HAT
CONTAINER REGISTRY

RED HAT
CONTAINER CATALOG

RED HAT
CONTAINER HEALTH INDEX

Use with Confidence

Support

Security

* Red Hat’s automated build and publishing services are optional, but recommended
COMMON CHOICES & PROBLEMS
Supportability is a major concern

Third Party OS & Platform

Third Party OS

Ideal Supportable Solution
UBI IS AVAILABLE TODAY
Use it with your favorite container engine

```
podman pull registry.access.redhat.com/ubi8/ubi
podman pull registry.access.redhat.com/ubi8/ubi-minimal
podman pull registry.access.redhat.com/ubi8/ubi-init
podman pull registry.access.redhat.com/ubi7/ubi
podman pull registry.access.redhat.com/ubi7/ubi-minimal
podman pull registry.access.redhat.com/ubi7/ubi-init
```
THANK YOU

plus.google.com/+RedHat
linkedin.com/company/red-hat
facebook.com/redhatinc
twitter.com/RedHat
youtube.com/user/RedHatVideos
SUPPORTABILITY MATRIX
Red Hat Support and Community Support

Red Hat Enterprise Linux 7
Red Hat Enterprise Linux 8
Like any upstream project
WHAT IS THE RED HAT UNIVERSAL BASE IMAGE?

The UBI is a subset of content from RHEL...

1. A set of three base images (ubi, ubi-minimal, ubi-init)
2. A set of language runtime images (nodejs, ruby, python, php, perl, etc)
3. A set of associated YUM repositories with common application dependency components
CAN BE BUILT & DEPLOYED ANYWHERE
On OpenShift and RHEL, or any container platform of your choice