Create custom images suitable for deploying systems using Red Hat Enterprise Linux image builder

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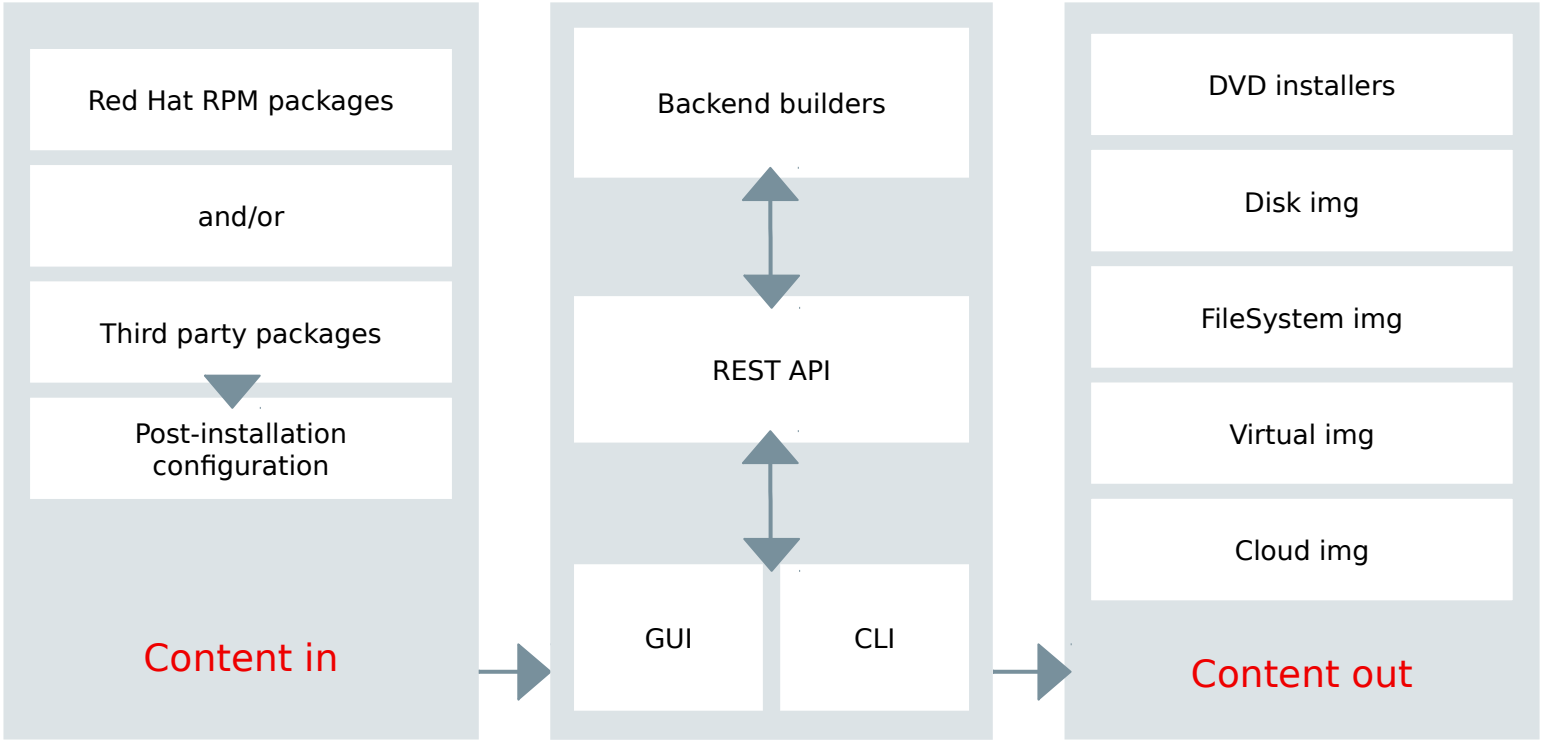
- What is Image Builder?

What is Image Builder?

- Image Builder is an image-building tool. Output image can be DVD installer, disk img, filesystem img, virtual img or cloud image.
- Introduced in RHEL 7.6 and RHEL 8
- Used to create custom deployable images (Customizatoin via rpm packages selection, post-install configuration, etc.)
- Create images in a variety of formats for deployment to a variety of environments
- Customize images for third-party packages and updated RHEL Errata content

What is Image Builder?



- Why Image Builder?

Why Image Builder?

Before Image Builder:

- Creating customized RHEL images was unsupported
- Clients and partners often requested the ability to customize
- Customization grew in importance for cloud environments

Why Image Builder?

- Provides an End-user with the ability to create supported custom RHEL images according to their needs
- Reduces deployment and configuration time on public cloud services
- Can be used to create images for deployment in a disconnected environment
- Output images can be configured for custom repositories (diverge from the Red Hat Content Delivery Network defaults)
- Provides package selection and configuration from a user-friendly web UI in the RHEL 8 web console
- Allows users to save and alter image configuration to create multiple replicas later

Why Image Builder?

- Supported output image formats:
  - Live ISO (.iso)
  - Raw disk (.img)
  - File system (.img)
  - Tarball (.tar.xz)
  - QCOW2 for KVM, Red Hat Virtualization, Red Hat Satellite, and Red Hat CloudForms
  - AMI (Amazon Web Services®)
  - VHD (Microsoft® Azure®)
  - VMDK (VMware® vSphere® Hypervisor)
  - QCOW2 for OpenStack

- How to use Image Builder?

How to use Image Builder?

Two known front-ends

- Command line tool
- GUI via Web Console plugin

How to use Image Builder?

Command line tool

- Actual command : *composer-cli*
- Get help about it : *composer-cli -h*
- Currently it has some functions that are only available in the CLI (e.g. post-install configuration)

How to use Image Builder?

GUI via Web Console plugin

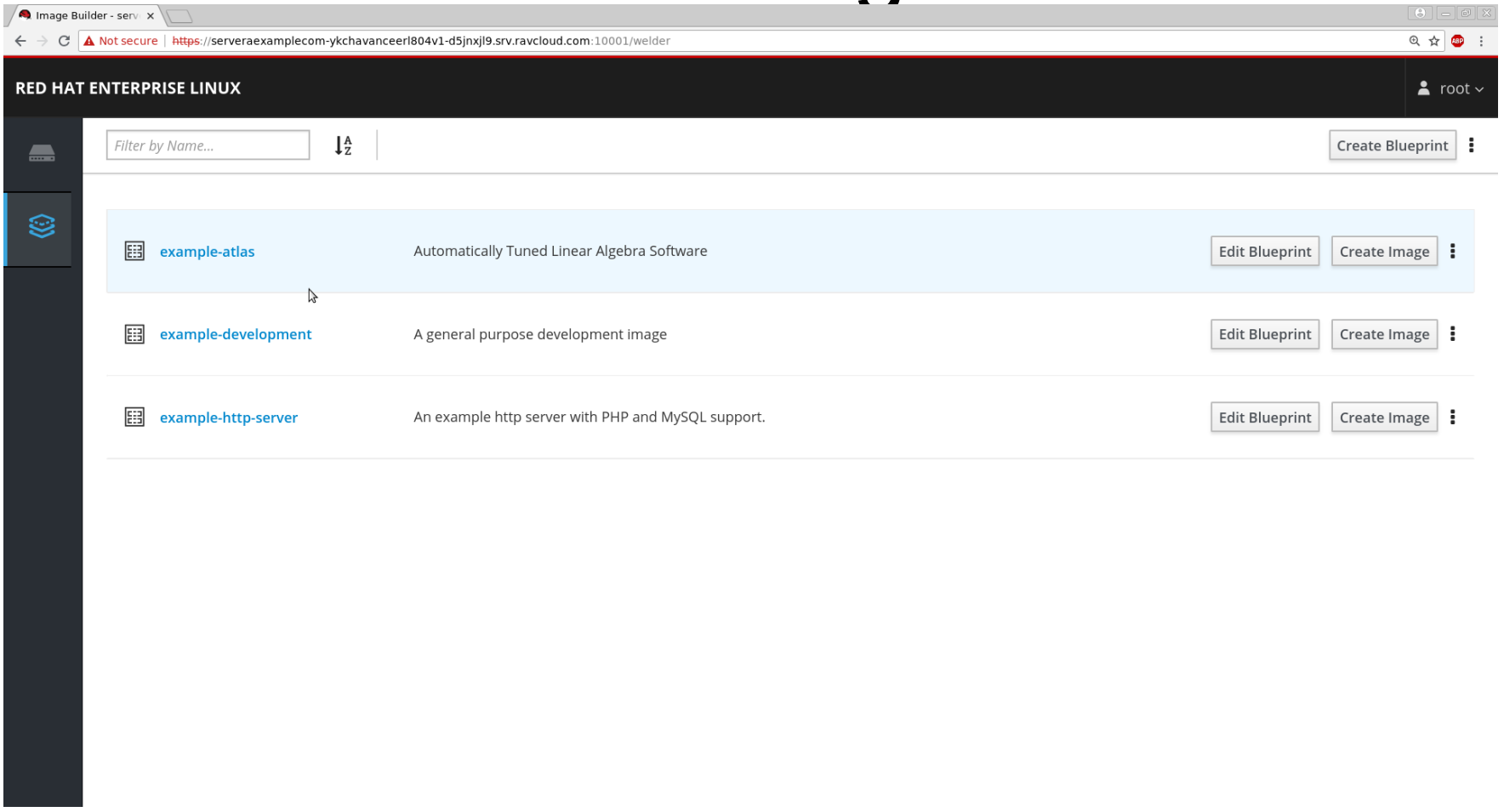
- Wait a minute… What is Web Console?
- Web Console
  - Web based system management tool. Available on all installations except - minimal installation

How to use Image Builder?

Web Console plugin

- Actual plugin name : **cockpit-composer**
- Allows using Image Builder remotely from a web interface
- Does not require having the GUI packages installed on the RHEL system
- Currently the Image Builder functions available in the web console are more limited than in the CLI

How to use Image Builder?



How to use Image Builder?

Blueprint

- a list of preselected components (RPM packages) that form a template for a custom image
- Create multiple images in multiple supported formats from the same blueprint
- A blueprint saves a record of the inputs and instructions for an image build

Talk is cheap.
Show me the Lab.

Lab Index

- Lab1 - Installation
- Lab2 - Create blueprint and image
- Lab3 - Test image with virt-install
- Lab4 - Customize blueprint
- Lab5 - Test output image

Lab - setup

- Red Hat Enterprise Linux 8 installed with Web Console
- Web Console enabled using command
  - *systemctl enable cockpit.socket*
- Installed **virt-viewer** and **virt-install** for testing output image

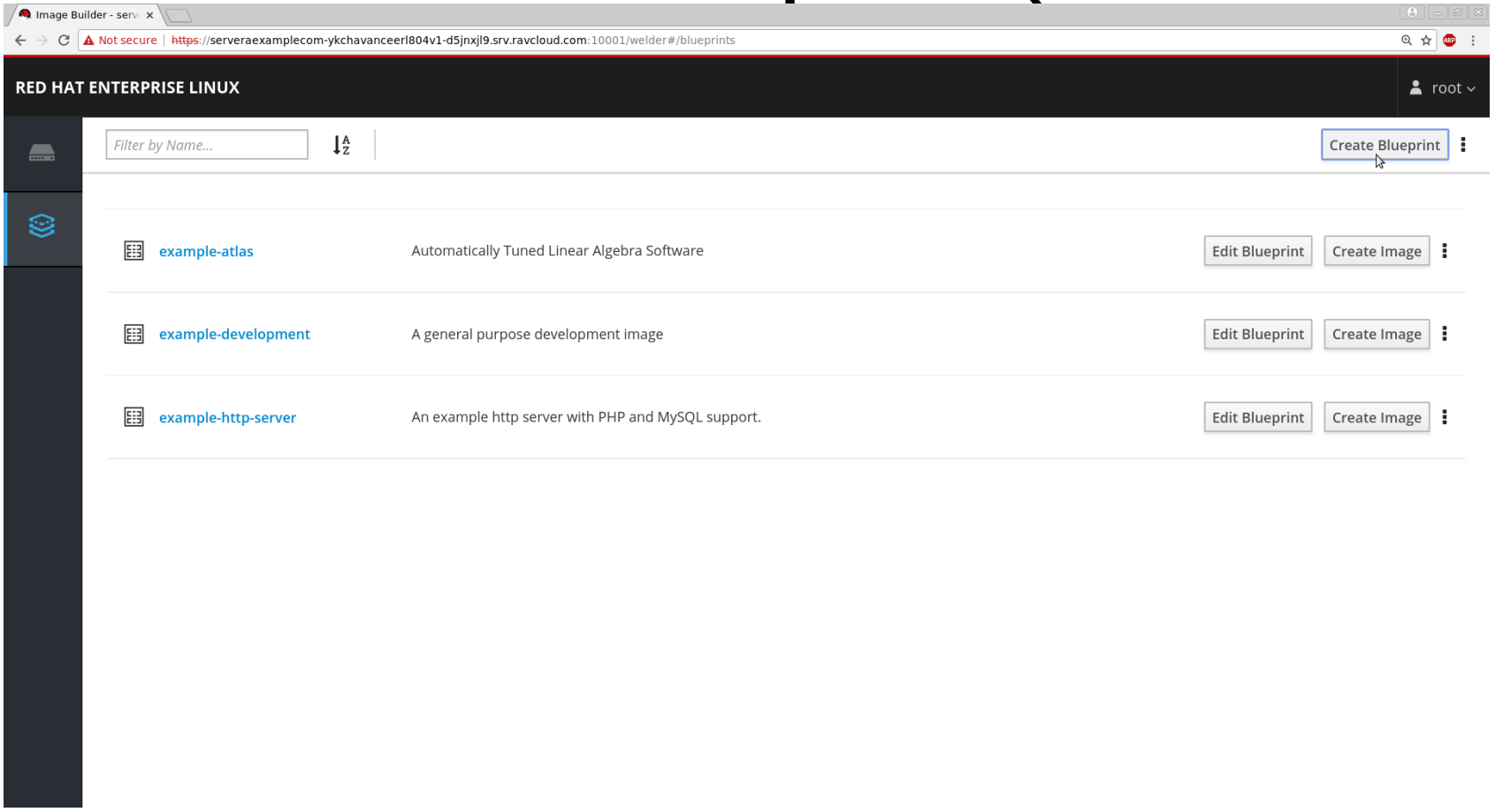
Lab Setup

- *Access Web Console via*
  - <*server hostname*>:9090 OR
  - <*server ip*>:9090
  - Username - lab-user
- Become root
  - *sudo -i*

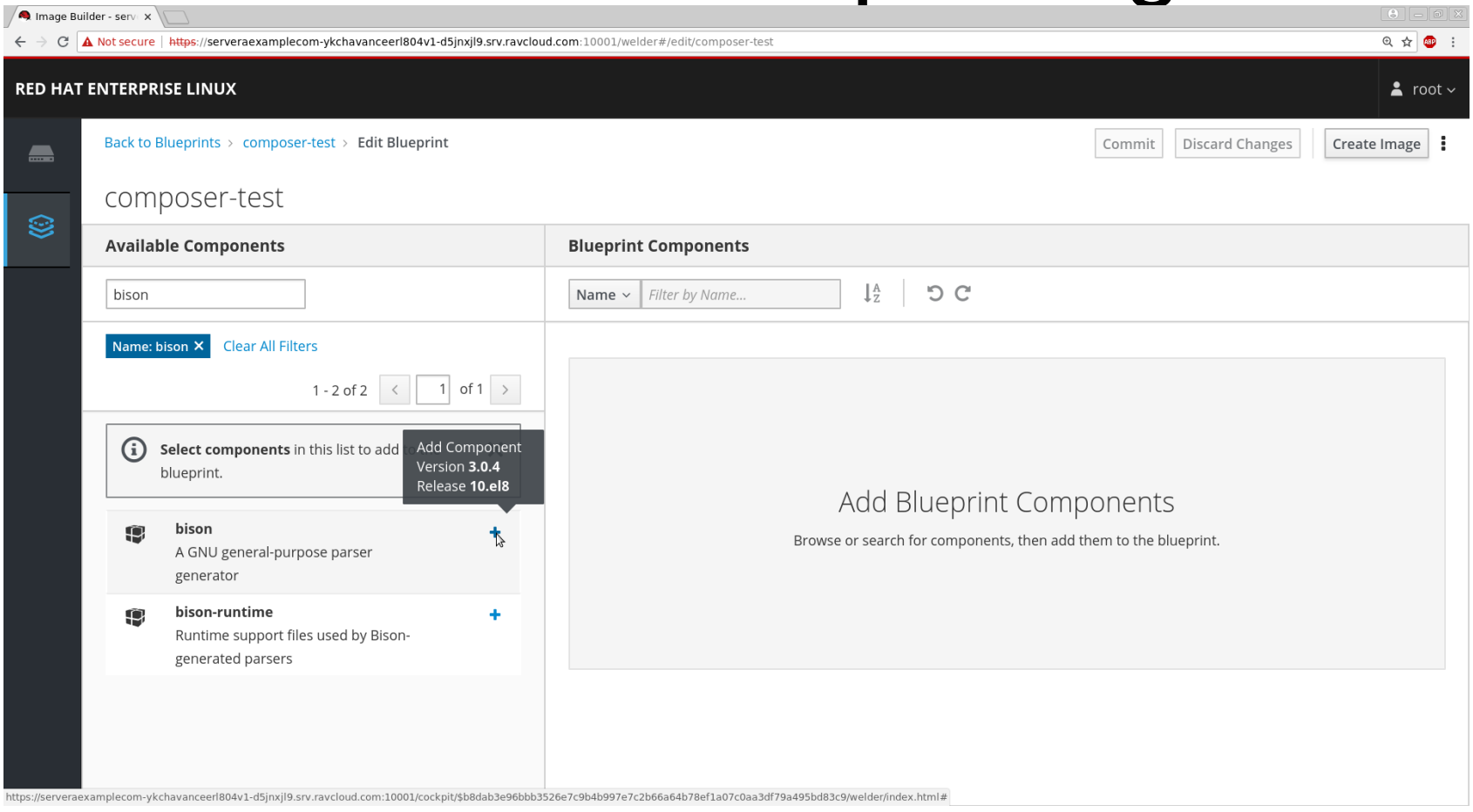
Lab1 - Installation

- Install Image Builder with the CLI and the web console plugin:
  - *yum install lorax lorax-composer composer-cli cockpit-composer*
- Enable and start composer service
  - *systemctl enable --now lorax-composer.socket*
- Restart cockpit service to load newly installed plugin
  - *systemctl restart cockpit.service*
  - Note: Above command disconnects Web Console. Reconnect.

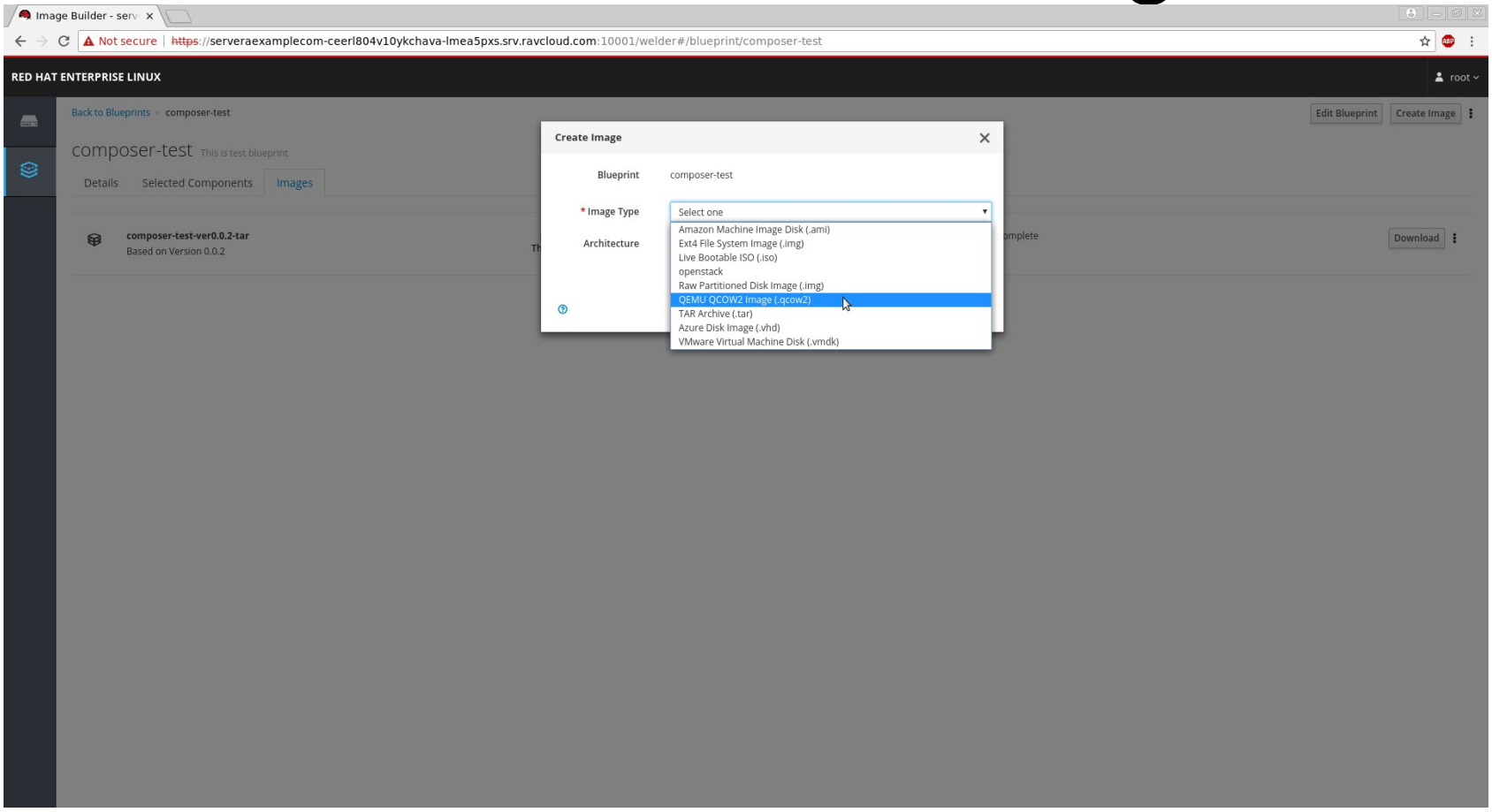
Lab2 - Create blueprint (summit19)



Lab2 – Select packages



Lab2 – Create image



Lab3 – Test image with virt-install

- Run this command to get GUID of image
  - *composer-cli compose list*
- **Get GUI of the server**
- Command to test image with virt-viewer
  - *virt-install --name RHEL8Lab2 --memory 2048 --vcpus 2 --os-variant rhel8.0 --import --disk /var/lib/lorax/composer/results/*<GUID number for that image>*/disk.qcow2*

Problem – No **cloud-init**

Images created with Image Builder in the web console:

- Have their root account locked for security purposes
- By default, do not have any other users configured
- Currently can not have a user added using just the web console (requires the CLI)
- This results in images that have no way to log in
- This is not a problem where cloud-init available

Lab4 – Get blueprint config file

- **Go back to Web Console of the server**
- Download a copy of the blueprint configuration file from Image Builder
  - *composer-cli blueprints save* <blueprint-name>
- You will get file <blueprint-name>.toml
- Blueprint configuration files follow TOML (Tom's Obvious, Minimal Language) format, which uses key/value pairs. For more information, see [TOML on GitHub] (https://github.com/toml-lang/toml).

Lab4 – Edit blueprint file

- Append follwing content to <blueprint-name>.toml file
  - [[customizations.user]]
  - name = "myuser"
  - password = “mypassword”
  - groups = ["users", "wheel"]

Lab4 – Push and verify config file

- Push the revised blueprint configuration file back to Image Builder:
  - *composer-cli blueprints push* <blueprint-name.toml>
- Verify that your changes appear in the configuration file
  - *composer-cli blueprints show* <blueprint-name>

Lab5 – Test image with virt-install

- Run this command to get GUID of image
  - *composer-cli compose list*
- **Get GUI of the server**
- Command to test image wit virt-viewer
  - *virt-install --name RHEL8Lab2 --memory 2048 --vcpus 2 --os-variant rhel8.0 --import --disk /var/lib/lorax/composer/results/*<GUID number for that image>*/disk.qcow2*
- *virt-viewer will be fired*

Lab5 – Test output image

Inside virt-viewer VM

- Login as myuser:mypassword
- Check if you are member of groups **users** and **wheel** by command
  - *id*
- Can you sudo?
  - *sudo -i*
- Do you have your specified package installed already?
  - *rpm -qa* | *grep* <package-name>

More user configuration options

- [[customizations.sshkey]]
- user = "root"
- key = "<public SSH key>"
- shell = "/usr/bin/bash"
- uid = 1001
- gid = 1001

Documentation

- Chapter 28 : Building custom system images with composer
  - https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/7/html/installation_guide/chap-composer-x86
- Chapter 6: Building custom system images with Composer
  - https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/8-beta/html/installing_and_deploying_rhel/building-custom-system-images-with-composer_graphical-installation