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Training and
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OPEN INNOVATION LABS

DevOps Culture and Practice Enablement

Containers, Registries, OpenShift (Kubernetes) Overview
Ansible Overview

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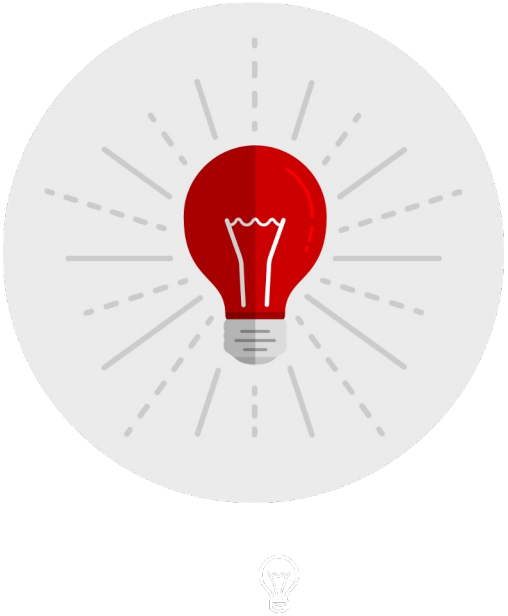
Topics

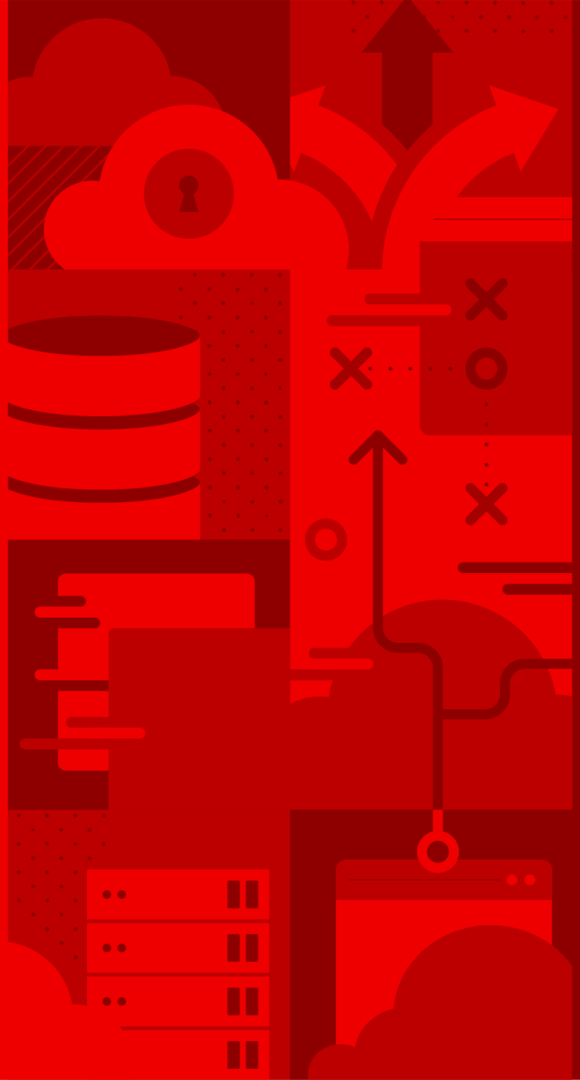


Containers
What are containers?

Registries (Image Registries)
What are container images and image registries?

OpenShift / Kubernetes
What exactly is OpenShift and Kubernetes?

Ansible
What exactly is Ansible?



Containers

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Container

A container is basically a running, virtualized application in a self-contained package. Containers are based on a **container image** which consists of the entire runtime environment including:

- The application
- All libraries and dependencies
- Additional binaries needed by the application
- Configuration files needed to run the application

https://www.redhat.com/en/topics/containers

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Containers

Julia Evans
@b0rk

containers aren't magic

These 15 lines of bash will start a container running the fish shell. Try it!
(download this script at bit.ly/containers-arent-magic)

```
wget bit.ly/fish-container -O fish.tar       # 1. download the image
mkdir container-root; cd container-root      #
tar -xf ../fish.tar                          # 2. unpack image into a directory
cgroup_id="cgroup_$(shuf -i 1000-2000 -n 1)" # 3. generate random cgroup name
cgcreate -g "cpu,cpuacct,memory:$cgroup_id"  # 4. make a cgroup &
cgset -r cpu.shares=512 "$cgroup_id"         #    set CPU/memory limits
cgset -r memory.limit_in_bytes=1000000000 \  #
      "$cgroup_id"                           #
cgexec -g "cpu,cpuacct,memory:$cgroup_id" \  # 5. use the cgroup
    unshare -fmuipn --mount-proc \           # 6. make + use some namespaces
    chroot "$PWD" \                          # 7. change root directory
    /bin/sh -c "                             #
        /bin/mount -t proc proc /proc &&     # 8. use the right /proc
        hostname container-fun-times &&      # 9. change the hostname
        /usr/bin/fish"                       # 10. finally, start fish!
```

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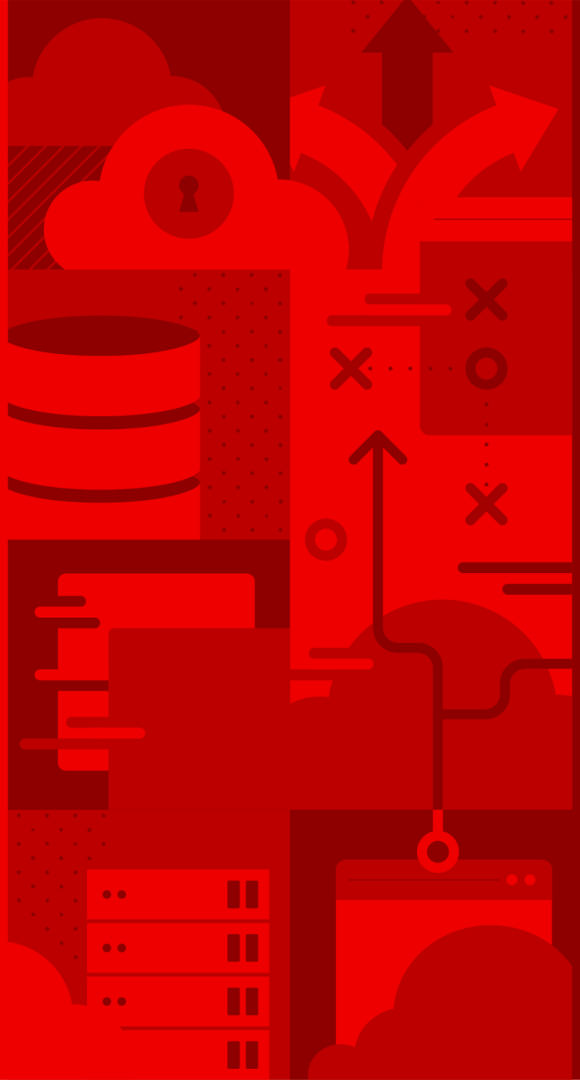
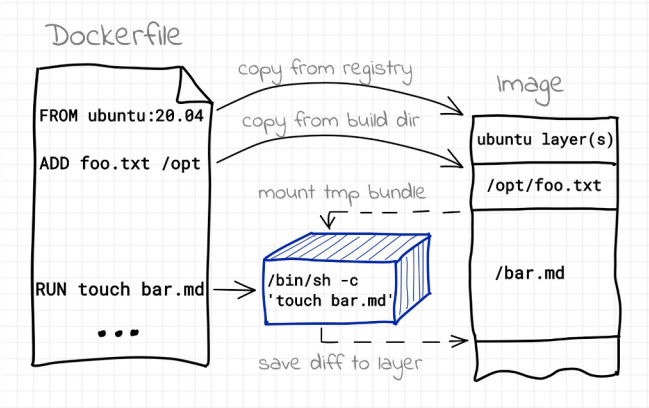
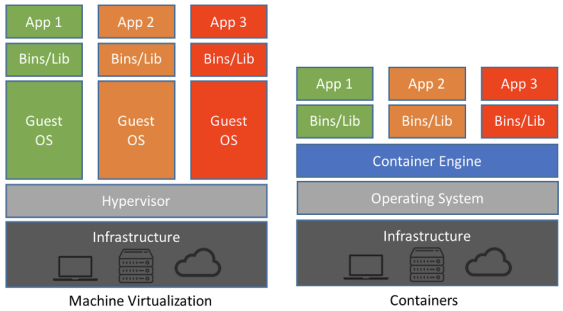


Registries

Container Image

A **container image**, in its simplest definition, is a file which is pulled down from a Registry Server and used locally as a mount point when starting Containers. Container images can be built based on instructions called Dockerfiles.





https://developers.redhat.com/blog/2018/02/22/container-terminology-practical-introduction

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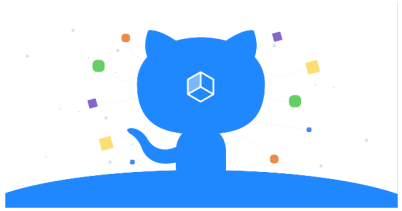
Container Image Registries



A container registry is **a repository, or collection of repositories, used to store container images for Kubernetes, DevOps, and container-based** application development.

https://www.redhat.com/en/topics/cloud-native-apps/what-is-a-container-registry#:~:text=A%20container%20registry%20is%20a,and%20container%2Dbased%20application%20development

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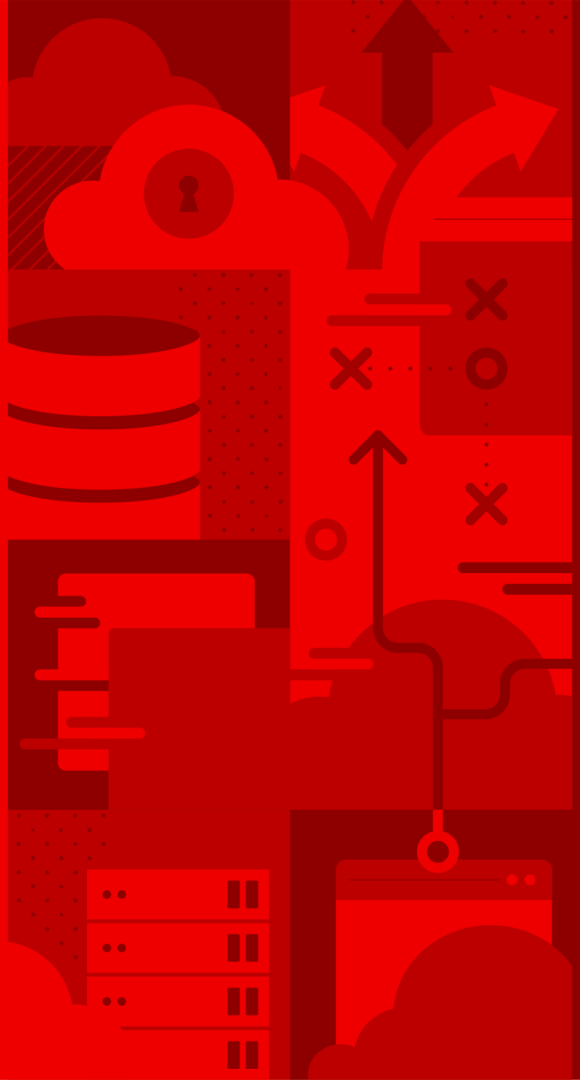

OpenShift & Kubernetes

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OpenShift and Kubernetes

kubernetes

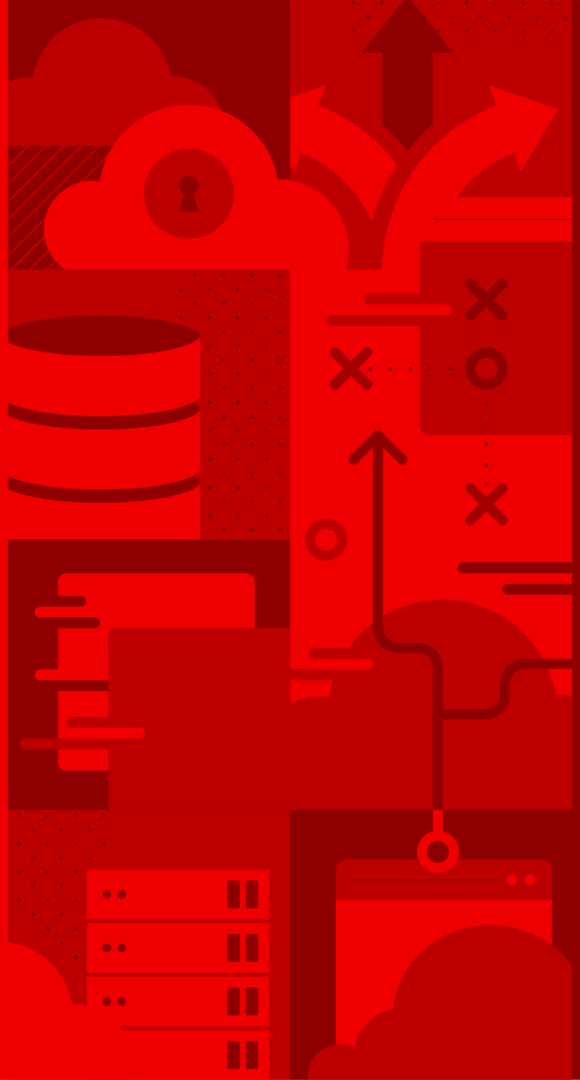
Kubernetes is an open-source container-orchestration system for automating computer application deployment, scaling, and management. It was originally designed by Google and is now maintained by the Cloud Native Computing Foundation (CNCF). Kubernetes is a portable, extensible, open-source platform for managing containerized workloads and services, that facilitates both declarative configuration and automation

https://kubernetes.io/docs/concepts/overview/what-is-kubernetes/

Red Hat® OpenShift® is an enterprise-ready Kubernetes container platform with full-stack automated operations to manage hybrid cloud, multi-cloud, and edge deployments. Extends existing Kubernetes framework with:

- Routes
- Dashboards (Unified UI)
- Monitoring/Metrics/Logging
- Integrated Developer workflows supporting CI/CD pipelines and S2I

https://www.redhat.com/en/technologies/cloud-computing/openshift



Ansible

Ansible Introduction & Overview

Ansible – An automation language leveraging modules to be used in one or more tasks on managed systems. Most Ansible automation leverages and Ansible playbook which is a YAML formatted file containing Ansible directives.

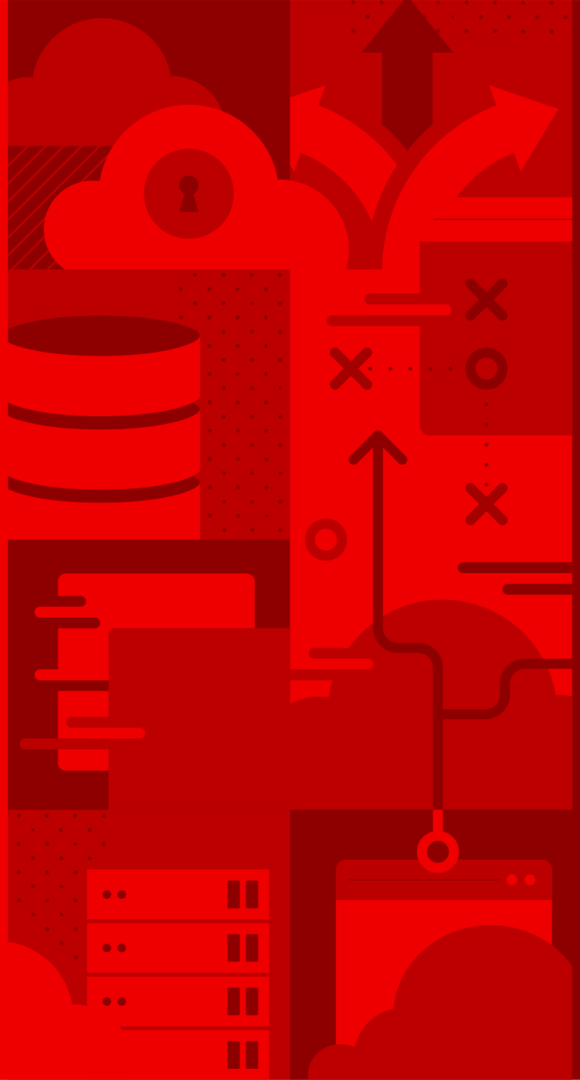
Ansible modules – Components used by Ansible tasks and playbooks which are generally implemented and developed in Python. Ansible modules work with certain system utilities and are optimized to be leveraged as a declarative automation language and provide idempotency.

Ansible ad-hoc commands – A way of executing a single Ansible task quickly that relies on a single Ansible module to perform the tests/changes of the task.

Ansible Roles– Curated, independent components of Ansible allowing re-use of common tasks. Roles can consist of variables, tasks, handlers, files, and templates.

Ansible Components & Commands

- **ansible.cfg** – Configuration file for running the **ansible** and **ansible-playbook** commands.
- **Inventory** – Inventory file used by the **ansible** and **ansible-playbook** commands identifying managed hosts/nodes and also contains Ansible inventory variables.
- **ansible** – Command used to perform/execute Ansible ad-hoc commands against a managed node.
- **ansible-playbook** – Command used to execute and run Ansible playbooks
- **ansible-galaxy** – Command to create or utilize Ansible roles. Many of these roles are published on http://galaxy.ansible.com
- **Playbook** – Collection of Ansible tasks organized into one or more Ansible plays.
- **Task** – Collection/list of Ansible modules arranged into instructions. Each task utilizes an Ansible module to perform a given action.
- **Ansible Module** – Specific module (small program generally implemented in Python) which perform the commands and executes the program to get the desired state of a given task.



Ansible Playbooks

Playbook Structure

```
---
- name: Ansiblize Managed Hosts
  hosts: localhost
  vars_files:
    - variables.yml

  tasks:
    - name: Create Ansible User
      debug:
          msg: This will use the USER  module

  handlers:
    - name: Restart SSHD
      debug:
          msg: This sill use the SERVICE or SYSTEMD
```


Sample Playbook

```yaml
---
- name: Register Hosts to Satellite
  hosts: rhel83_test
  vars_files:
    - sat_vars.yml
  vars:
    activation_key: rhhi-vm
    lifecycle_env: Library
    Organization_Name: MichetteTech
    Sat_User_Name: sat_user_name
    Sat_User_PW: sat_password
    SatURL: https://sat6.michettetech.com

  tasks:
    - name: Prepare System for Satellite Registration - Get Cert
      get_url:
        url: "{{ SatURL }}/pub/katello-ca-consumer-latest.noarch.rpm"
        dest: /tmp/katello-latest.rpm
        validate_certs: no

    - name: Install Katello rpm
      yum:
        name: /tmp/katello-latest.rpm
        state: latest
        disable_gpg_check: yes
```

Thank you

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