



Automating Container Deployments on Virtualization with Ansible: OpenShift on Red Hat Virtualization

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About Me



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AGENDA

OVERVIEW OF RED HAT VIRTUALIZATION

WHY OPENSIFT CONTAINER PLATFORM ON RHV

DEPLOY OPENSIFT CONTAINER PLATFORM ON RHV

DEPLOY CONTAINERS ON OPENSIFT WITH ANSIBLE PLAYBOOK
BUNDLE

WRAP UP / Q&A

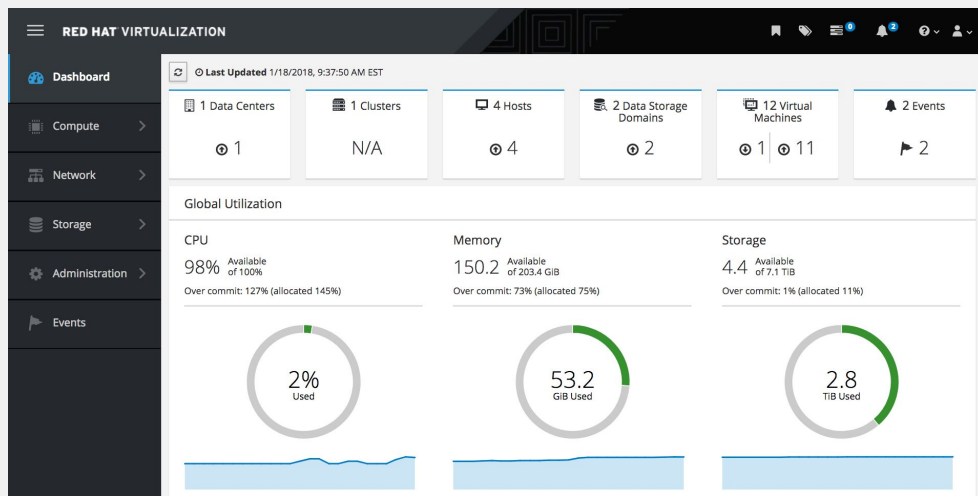
RED HAT VIRTUALIZATION

WHAT IS IT?

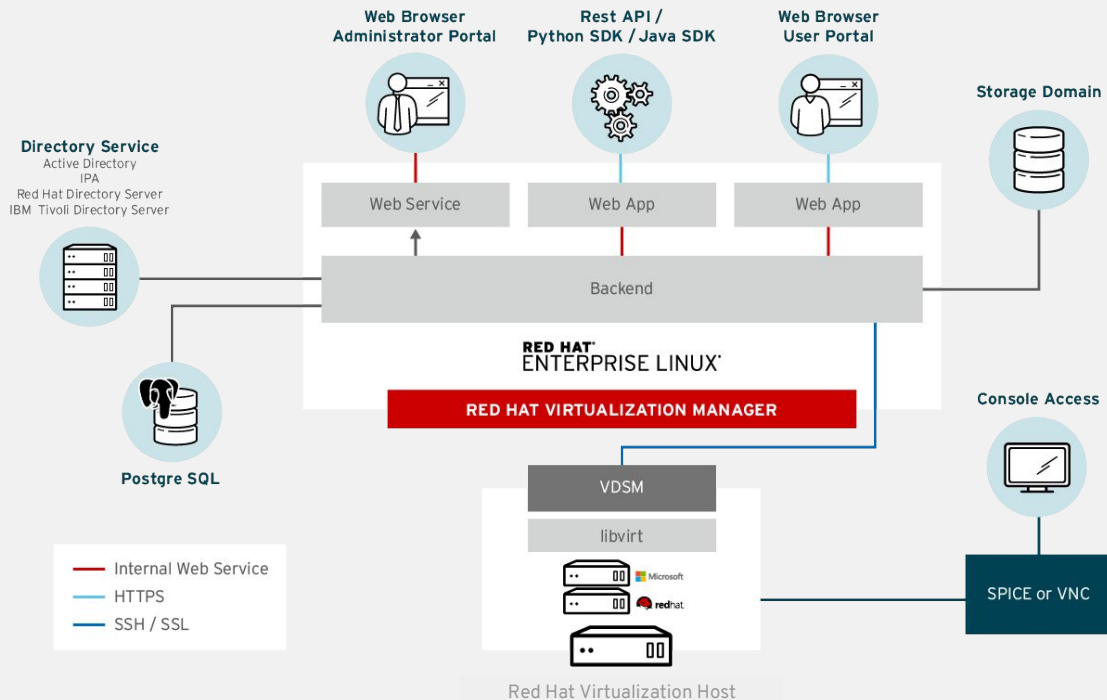
Centralized Management of virtualized compute, network, and storage resources using the Open Source KVM Hypervisor

Automated workload management, scalability, and security features for virtualized applications

Engineered to optimize current IT and integrate with future technologies using a RESTful API



RED HAT VIRTUALIZATION



YAML VARIABLES EXAMPLE

```
#####  
# REST API variables  
#####  
engine_url: https://engine/ovirt-engine/api  
engine_user: admin@internal  
engine_password: "{{ vault_rhvm_pass }}"  
engine_cafile: /etc/pki/ovirt-engine/ca.pem  
engine_insecure: false  
  
#####  
# Common  
#####  
compatibility_version: 4.1  
# Data center  
data_center_name: mydatacenter  
  
#####  
# Clusters  
#####  
clusters:  
  - name: production  
    cpu_type: Intel Conroe Family  
    profile: production
```

```
#####  
# Hosts  
#####  
hosts:  
  - name: myhost1  
    address: 10.34.60.25  
    cluster: production  
    password: 123456  
  - name: myhost2  
    address: 10.34.61.35  
    cluster: production  
    password: 123456  
  
#####  
# Storage  
#####  
storages:  
  nfs:  
    master: true  
    state: present  
  nfs:  
    address: nfs.fqdn.com  
    path: /path/to/share
```

PLAYBOOK EXAMPLE

```
---
- name: Setup oVirt environment
  hosts: ovirt
  tasks:
    - block:
      - name: Include oVirt password
        no_log: true
        include_vars: ovirt_password.yml

      - name: Obtain SSO token
        no_log: false
        ovirt_auth:
          url: "{{ url }}"
          username: "{{ username }}"
          password: "{{ password }}"
          ca_file: "{{ ca_file }}"

      - name: Create datacenter
        ovirt_datacenters:
          auth: "{{ ovirt_auth }}"
          name: "{{ datacenter }}"
          description: mydatacenter
```

```
- name: Create logical network
  ovirt_networks:
    auth: "{{ ovirt_auth }}"
    name: mynetwork
    datacenter_name: mydatacenter
    vm_network: false

- name: Create cluster
  ovirt_clusters:
    auth: "{{ ovirt_auth }}"
    datacenter_name: "{{ datacenter }}"
    name: "{{ cluster }}"
    cpu_type: Intel Nehalem Family
    description: mycluster
    compatibility_version: 4.1

- name: Add host using public key
  ovirt_hosts:
    auth: "{{ ovirt_auth }}"
    public_key: true
    cluster: "{{ cluster }}"
    name: "{{ host }}"
    address: "{{ host_address }}"
```

PLAYBOOK EXAMPLE

```
- name: oVirt image template
  hosts: localhost
  connection: local
  gather_facts: false

  vars_files:
    # Contains encrypted `engine_password` variable using ansible-vault
    - passwords.yml

  vars:
    engine_url: https://ovirt-engine.example.com/ovirt-engine/api
    engine_user: admin@internal
    engine_cafile: /etc/pki/ovirt-engine/ca.pem
    qcow_url: https://cloud.centos.org/centos/7/images/CentOS-7-x86_64-GenericCloud.qcow2
    template_cluster: testcluster
    template_name: centos7_template
    template_memory: 2GiB
    template_cpu: 2
    template_disk_size: 10GiB
    template_disk_storage: nfs

  roles:
    - ovirt-image-template
```


RED HAT VIRTUALIZATION USE CASES



MISSION CRITICAL VIRTUALIZATION

Unmatched scale and performance for enterprise workloads, including SAP and Oracle, on x86 and Power



CLOUD TRANSITION

Co-engineered with Red Hat OpenStack for a smooth transition into Private and Public clouds



DEV/TEST

Simple, inexpensive self-serve infrastructure for enterprise development

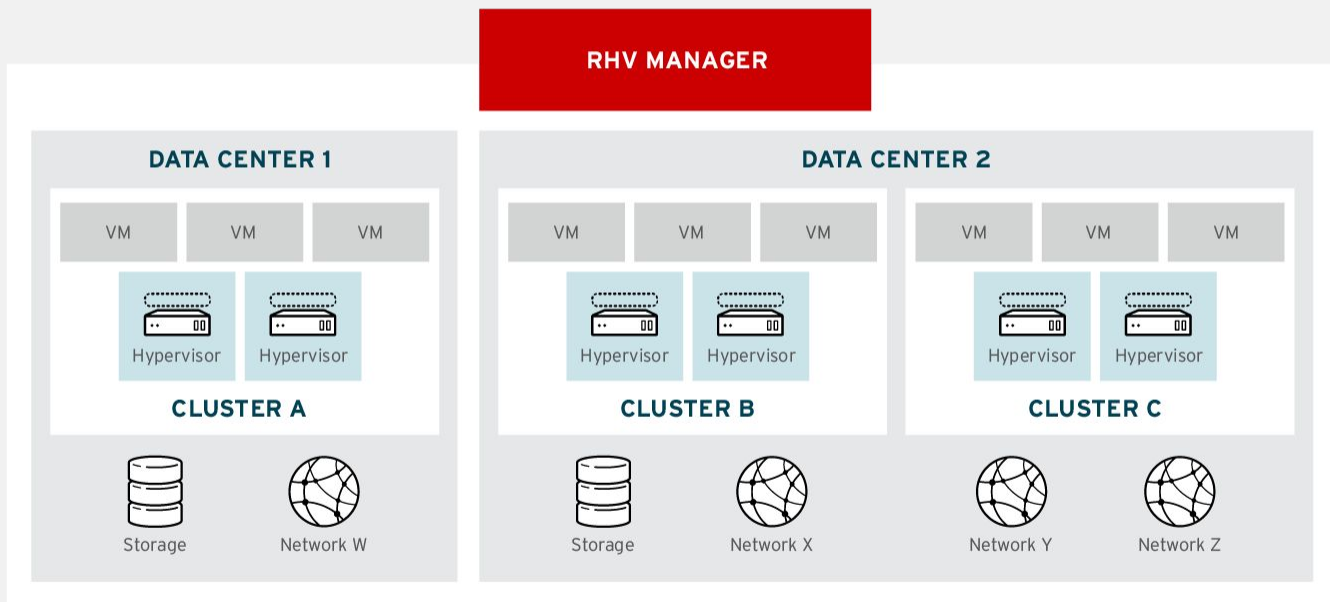


TECHNICAL WORKSTATIONS

Gain performance and reduce cost of resource intensive Linux workstations (e.g. CAD/CAM)

RED HAT VIRTUALIZATION

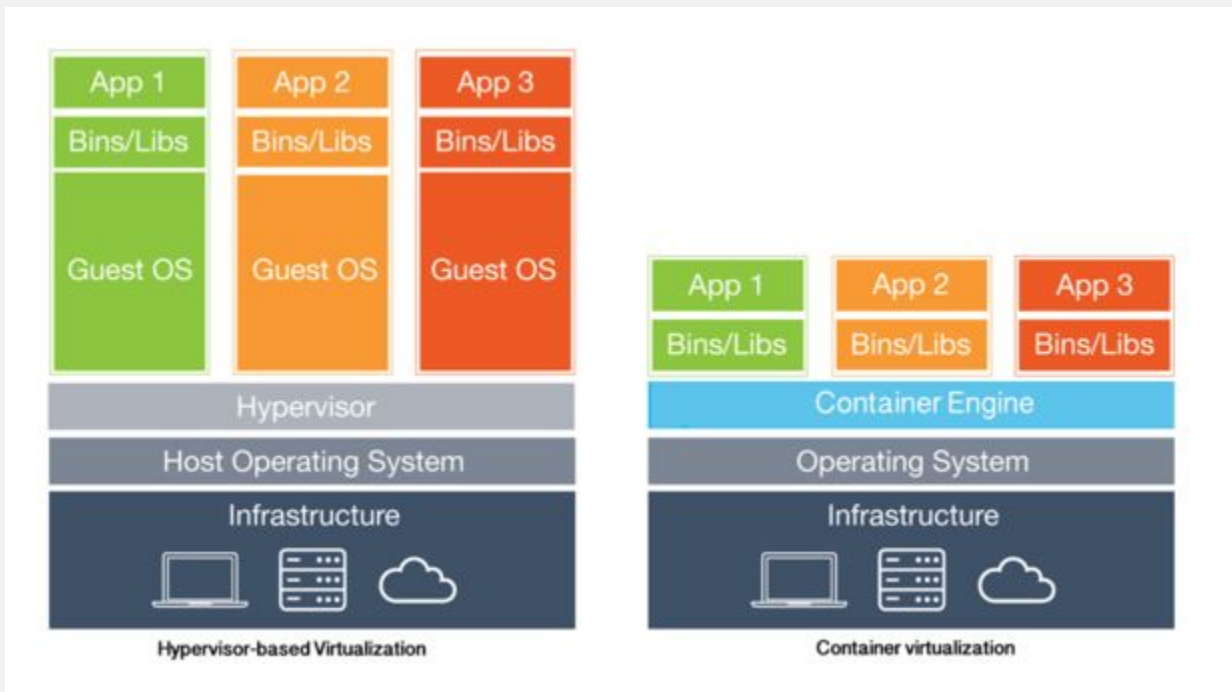
Data Centers, Clusters, and Virtual Machines



WHY OPENSIFT ON RHV

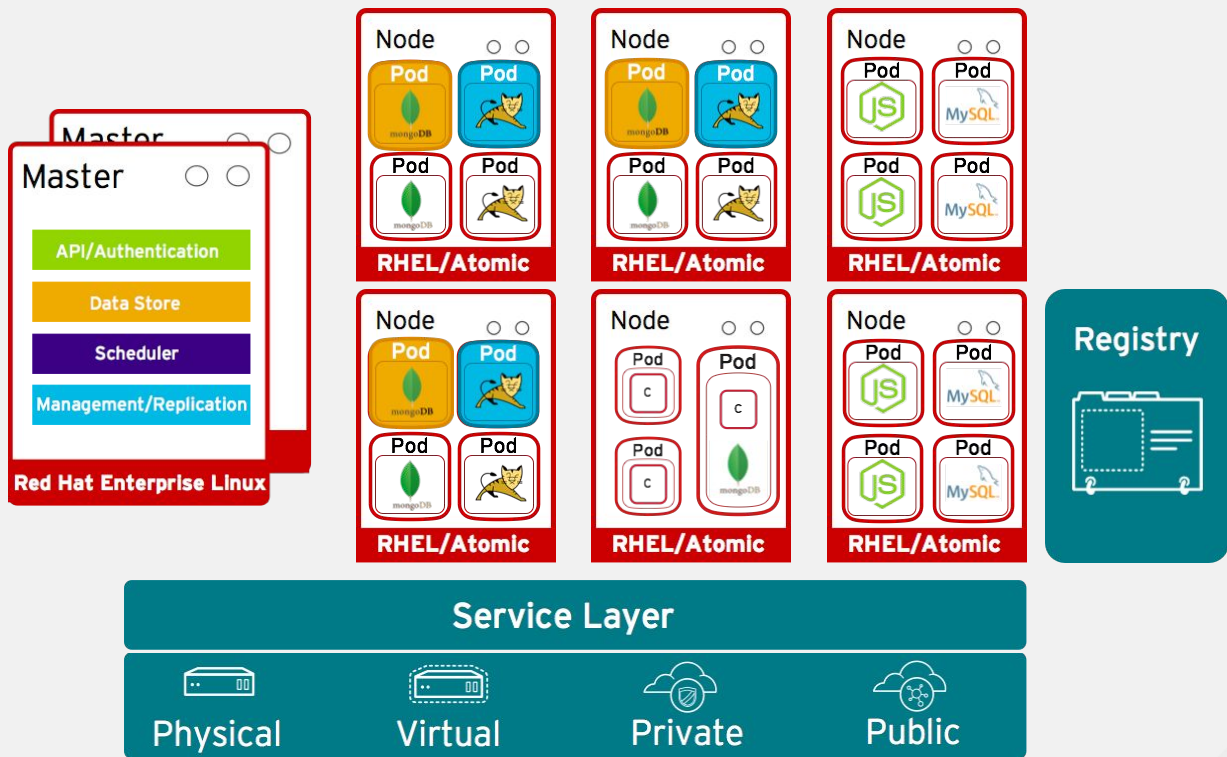
OpenShift 50k view

OpenShift Intro



OpenShift 50k view

OpenShift Intro



WHY OPENSIFT ON RHV



OPENSIFT

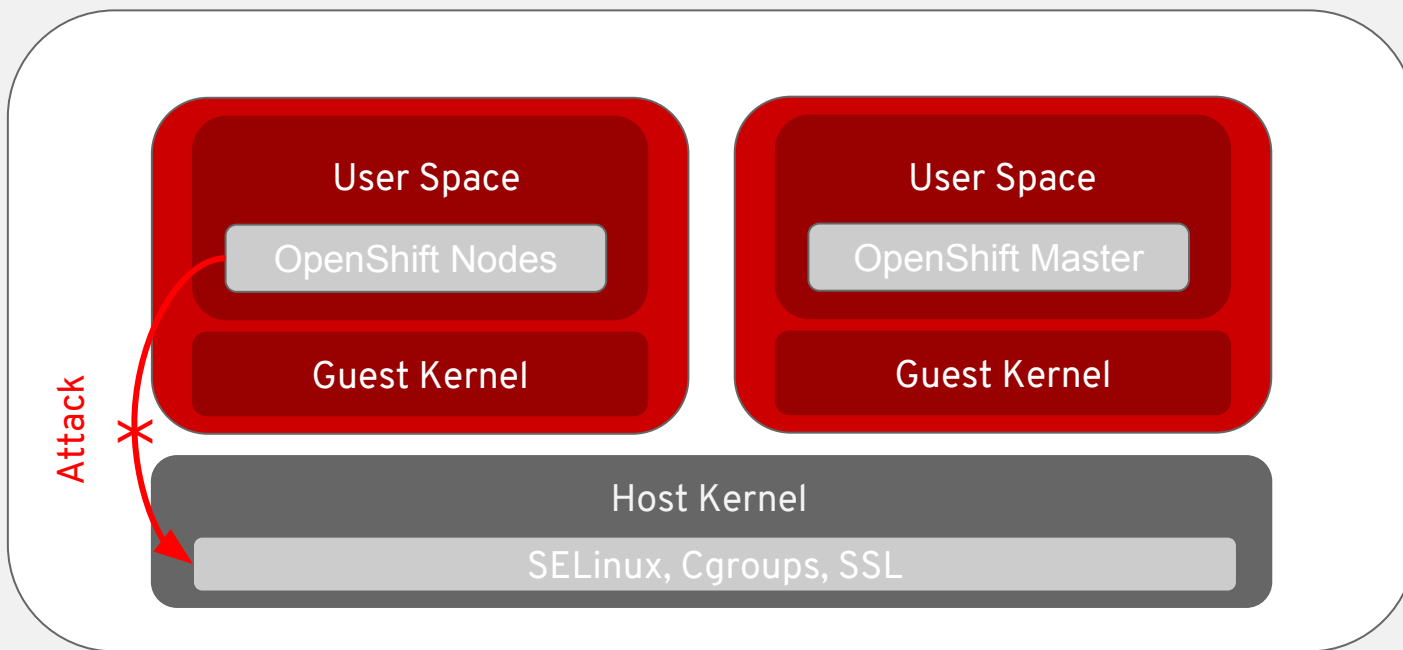
RED HAT® VIRTUALIZATION



**RED HAT®
ENTERPRISE
LINUX®**



WHY OPENSIFT ON RHV (Secure Virtualization)



Secure Virtualization Part 1

“Multi tenancy for virtual machines”

```
[root@cloud-sb12 ~]# ps -efZ | grep qemu
```

```
system_u:system_r:svirt_t:s0:c557,c698 qemu 7292 1 45 2017 ? 22-05:44:06  
/usr/libexec/qemu-kvm -name guest=osenode1,d .....
```

```
system_u:system_r:svirt_t:s0:c160,c719 qemu 12561 1 33 2017 ? 22-21:47:15 /usr/libexec/qemu-kvm  
-name guest=cfme58ui1 .....
```

```
[root@cloud-sb12 ~]# ls -lZ /var/lib/libvirt/qemu/
```

```
drwxr-x---. qemu qemu system_u:object_r:svirt_image_t:s0:c160,c719 domain-2-cfme58ui1
```

```
drwxr-x---. qemu qemu system_u:object_r:svirt_image_t:s0:c557,c698 domain-5-osenode1
```


Secure Virtualization Part 2

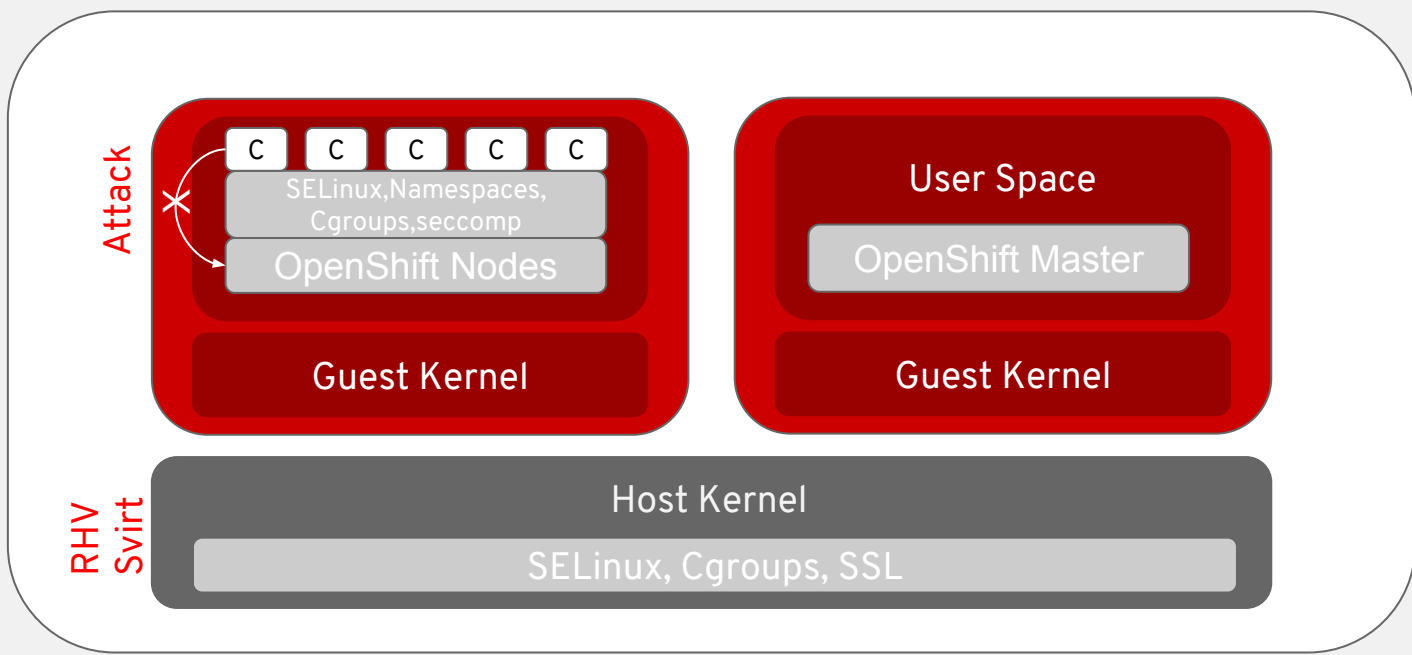
“Multi tenancy for virtual machines”

```
[root@cloud-sb12 ~]# lsuf -Z -p 7292
```

COMMAND	PID	SECURITY-CONTEXT	USER	FD	TYPE	DEVICE	SIZE/OFF	NODE NAME
qemu-kvm	7292	system_u:system_r:svirt_t:s0:c557,c698	qemu	txt	REG		253,0	8925936
100742721 /usr/libexec/qemu-kvm								
qemu-kvm	7292	system_u:system_r:svirt_t:s0:c557,c698	qemu	mem	REG		253,0	57888
68343867 /usr/lib64/sasl2/libdigestmd5.so.3.0.0								
qemu-kvm	7292	system_u:system_r:svirt_t:s0:c557,c698	qemu	mem	REG		253,0	24168
68343864 /usr/lib64/sasl2/libcrammd5.so.3.0.0								

WHY OPENSIFT ON RHV (OCP Security)

Ten Layers of Container Security



WHY OPENSIFT ON **RHV** (containers)



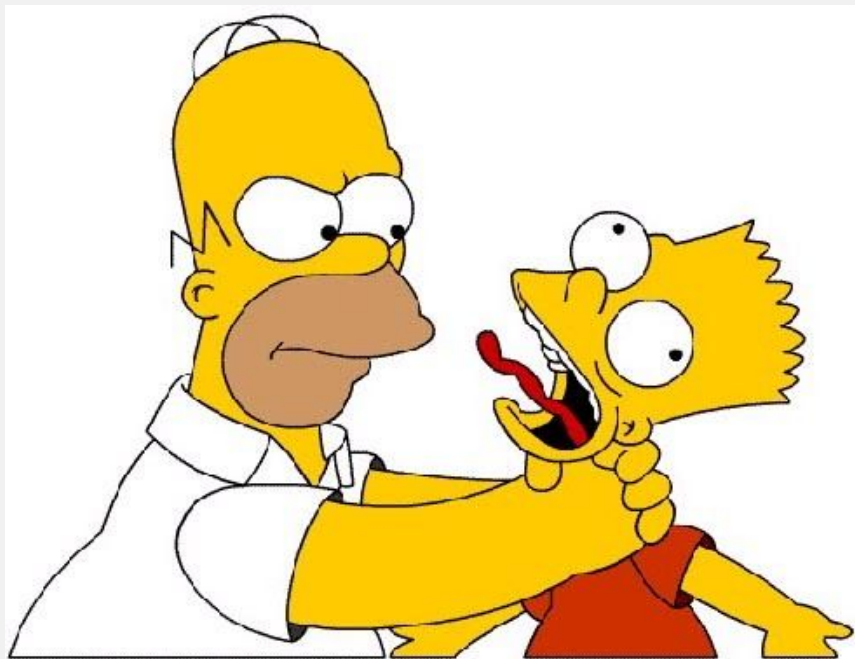
WHY OPENSIFT ON RHV (stack Integration)

The diagram illustrates the stack integration for OpenShift on Red Hat Virtualization (RHV). It is divided into two main sections by a red border. The top section features the OpenShift logo (a red circle with a white 'O' and a red 'S') and a blue circular seal with 'CERTIFIED TESTED CERTIFIED' around the perimeter. Below this is a black horizontal bar with the text 'RED HAT VIRTUALIZATION' in white. To the right of this bar is another blue circular seal with 'CERTIFIED TESTED CERTIFIED'. The bottom section features the GlusterFS logo (an orange ant carrying a green leaf) and the Ceph logo (a red circle with a white 'C' and the text 'ceph'). In the center of this section is the text 'RED HAT ENTERPRISE LINUX' in black. To the right of this text is a third blue circular seal with 'CERTIFIED TESTED CERTIFIED'.

<https://access.redhat.com/articles/2176281>

WHY OPENSIFT ON RHV (Support)

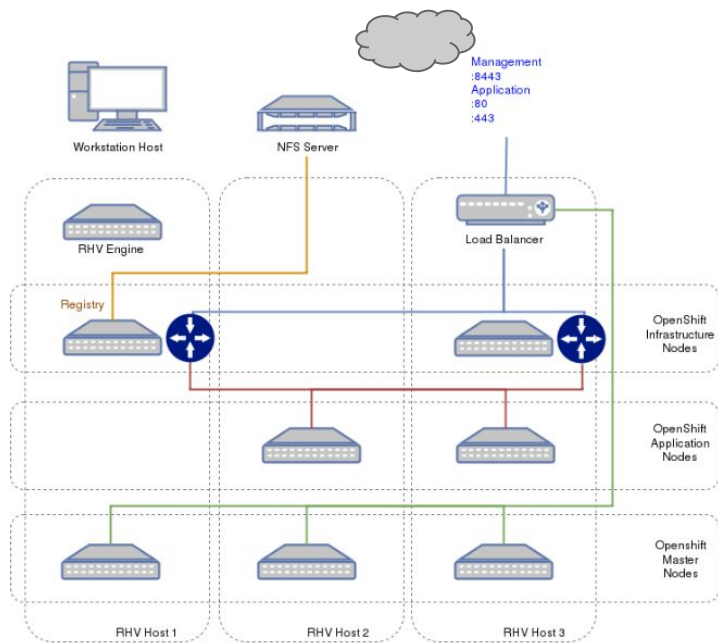
One throat to choke



FULLY AUTOMATED DEPLOY OF OCP ON RHV

THE ARCHITECTURE

OpenShift Production Deployment



Pre Requirements OpenShift on RHV via Ansible

“Key to success”

- ansible 2.4.1.0 (you can get this from the rhel extras channel)
- Get the following packages for the OpenShift install:

`openshift-ansible-docs-3.7.14-1.git.0.4b35b2d.el7.noarch`

`openshift-ansible-callback-plugins-3.7.14-1.git.0.4b35b2d.el7.noarch`

`openshift-ansible-lookup-plugins-3.7.14-1.git.0.4b35b2d.el7.noarch`

`openshift-ansible-roles-3.7.14-1.git.0.4b35b2d.el7.noarch`

`openshift-ansible-3.7.14-1.git.0.4b35b2d.el7.noarch`

`openshift-ansible-playbooks-3.7.14-1.git.0.4b35b2d.el7.noarch`

`openshift-ansible-filter-plugins-3.7.14-1.git.0.4b35b2d.el7.noarch`

- Clone <https://github.com/ldomb/OpenShiftOnRHV>

MODULE EXAMPLE

```
# Run VM with cloud init:
- name: create the VM {{ vm_name }}
  ovirt_vms:
    auth: "{{ ovirt_auth }}"
    state: running
    name: "{{ vm_name }}-{{ item }}"
    cluster: "{{ cluster }}"
    memory: 16GiB
    cpu_sockets: 2
    wait: True
    template: "{{ template_name }}"
    nics:
      - name: nic1
        profile_name: "{{ network_name }}"
        interface: virtio
    cloud_init:
      host_name: "{{ vm_name }}-{{ item }}"
      dns_servers: "{{ dns }}"
      custom_script: |
        runcmd:
          - echo "we are installing OpenShift"
  with_sequence:
    count={{ count }}
```

```
# RHV authentication:
- name: Authenticate to RHV-M
  ovirt_auth:
    url: "https://{{ rhvm_addr }}/ovirt-engine/api"
    username: "{{ rhv_user }}"
    password: "{{ rhv_pass }}"
    insecure: true
```

```
- name: create the docker disk for {{ vm_name }}
  ovirt_disks:
    auth: "{{ ovirt_auth }}"
    name: "{{ vm_name }}-{{ item }}-disk2"
    interface: virtio_scsi
    vm_name: "{{ vm_name }}-{{ item }}"
    size: "{{ db_size }}GiB"
    format: cow
    storage_domain: "{{ datastore }}"
```

Building the ansible inventory dynamically

“/etc/ansible/hosts”

```
# Create an OSEv3 group that contains the masters and nodes groups
[OSEv3:children]
masters
nodes
# Set variables common for all OSEv3 hosts
[OSEv3:vars]
# SSH user, this user should allow ssh based auth without requiring a password
ansible_ssh_user=root
deployment_type=openshift-enterprise
# host group for masters
[masters]
master.example.com
# host group for nodes, includes region info
[nodes]
master.example.com openshift_node_labels="{ 'region': 'infra', 'zone': 'default' }"
node1.example.com openshift_node_labels="{ 'region': 'primary', 'zone': 'east' }"
node2.example.com openshift_node_labels="{ 'region': 'primary', 'zone': 'west' }"
```

In Memory Inventories

```
- name: add master server to inventory
add_host:
  hostname: "{{ item.fqdn }}"
  ansible_ssh_user: root
  ansible_ssh_pass: "{{ cf_ssh_pass }}"
  fqdn: "{{ item.fqdn }}"
  groups: masters
with_items: "{{ ovirt_vms }}"
when: master and createvm
```

```
- name: add appnodes to inventory
add_host:
  hostname: "{{ item.fqdn }}"
  ansible_ssh_user: root
  ansible_ssh_pass: "{{ cf_ssh_pass }}"
  fqdn: "{{ item.fqdn }}"
  groups: nodes
  openshift_node_labels: '{"region': 'primary', 'zone': 'west'}"
with_items: "{{ ovirt_vms }}"
when: appnode and createvm
```

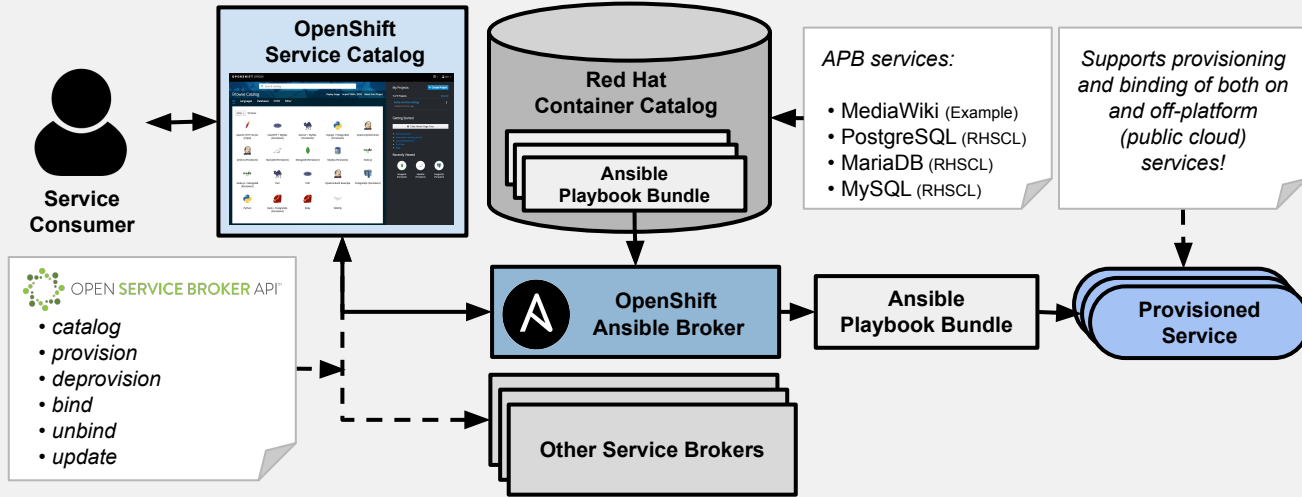
```
- name: add infranodes to inventory
add_host:
  hostname: "{{ item.fqdn }}"
  ansible_ssh_user: root
  ansible_ssh_pass: "{{ cf_ssh_pass }}"
  fqdn: "{{ item.fqdn }}"
  groups: nodes
  openshift_node_labels: '{"region': 'infra', 'zone': 'default'}"
with_items: "{{ ovirt_vms }}"
when: infranode and createvm
```

```
- name: add lb to inventory
add_host:
  hostname: "{{ item.fqdn }}"
  ansible_ssh_user: root
  ansible_ssh_pass: "{{ cf_ssh_pass }}"
  fqdn: "{{ item.fqdn }}"
  group: lb
with_items: "{{ ovirt_vms }}"
when: lb and createvm
```


DEPLOY CONTAINERS ON OPENSSHIFT WITH ANSIBLE PLAYBOOK BUNDLE

Ansible Service Broker

Ansible Playbook Bundle



How it Works:

Consumers interact with the Service Catalog to provision and manage services, the details of broker remains largely hidden

Description:

- Implementation of Open Service Broker API enabling users to leverage Ansible for provisioning and managing of services from Service Catalog
- Supports production workloads and multiple service plans
- Secure connectivity now between Service Catalog and Broker

What is Ansible Playbook Bundle

“APB”

An Ansible Playbook Bundle (APB) is a lightweight application definition (meta-container). They are used to define and deploy complex groups of applications, deployment configs, deployments, and services to an OpenShift cluster running the Ansible Service Broker. APBs have the following features:

- Metadata contains list of required/optional parameters for use during deployment.
- Leverages existing investment in Ansible Roles / Playbooks.
- Actions under a directory with named playbooks and metadata defined in `apb.yml`.
- Developer tooling to drive a guided approach.
- Easily modified or extended.

What is Ansible Playbook Bundle examples

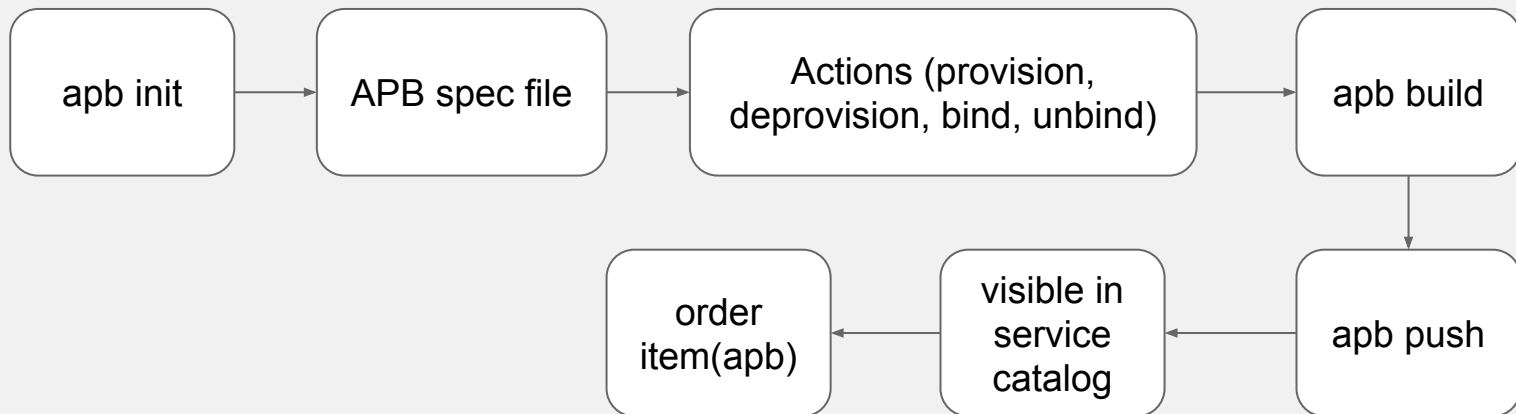
“examples”

The project ansible playbook bundle can be found on github as well as examples which can be imported into OpenShift:

- <https://github.com/ansibleplaybookbundle/ansible-playbook-bundle>
- <https://github.com/fusor/apb-examples>
- [Build the Rocketchat APB with OpenShift 3.7](#)

Steps to an APB

“howto”



What is Ansible Playbook Bundle

“APB init”

apb.yml	The APB spec declaration
Dockerfile	The APB’s Dockerfile
playbooks/provision.yml	An Ansible Playbook defining the APB’s provision action
playbooks/deprovision.yml	An Ansible Playbook defining the APB’s deprovision action
roles/provision-rocketchat-apb	An Ansible Role defining which tasks are run on provision
roles/deprovision-rocketchat-apb	An Ansible Role defining which tasks are run on deprovision

APB after successful push

“Important”

Found registry IP at: 172.30.224.145:5000 Building image with the tag:

172.30.224.145:5000/openshift/rocketchat-apb Successfully pushed image:

172.30.224.145:5000/openshift/rocketchat-apb Contacting the

ansible-service-broker at:

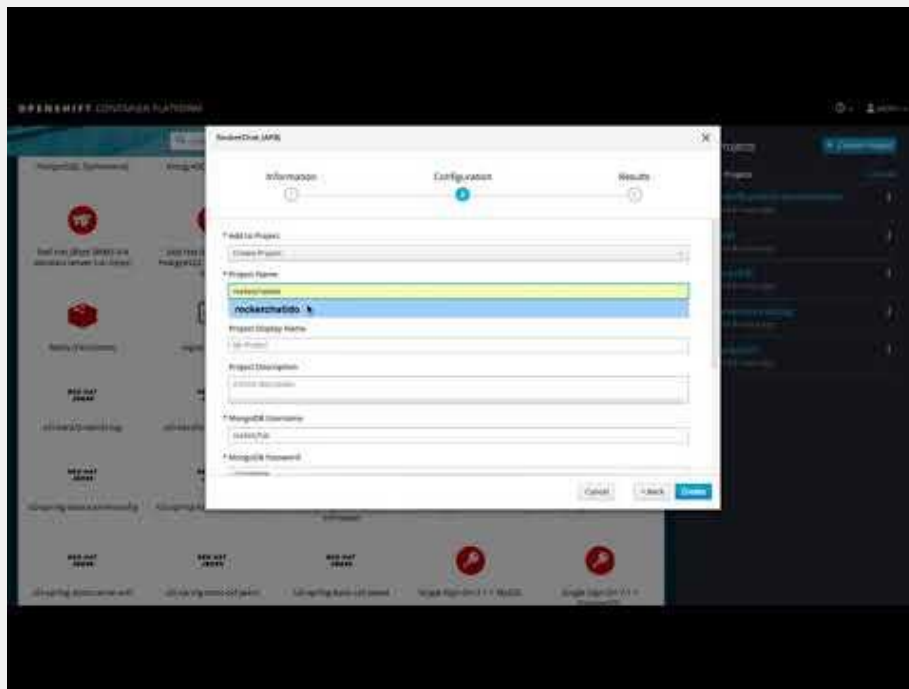
[https://asb-1338-openshift-ansible-service-broker.apps.local.redhat-demo.com/ansi](https://asb-1338-openshift-ansible-service-broker.apps.local.redhat-demo.com/ansible-service-broker/v2/bootstrap)

[ble-service-broker/v2/bootstrap](https://asb-1338-openshift-ansible-service-broker.apps.local.redhat-demo.com/ansible-service-broker/v2/bootstrap) **Successfully bootstrapped Ansible Service Broker**

Successfully relisted the Service Catalog

Ansible Playbook Bundle DEMO

“APB Demo”



<https://youtu.be/jhy8lfgxNg8>

Presentation Recap

“Key Takeaways”

- Red Hat Virtualization is **secure**, fast, tested, reliable and transparent. The core RHV Infrastructure (RHVM, DC, Clusters, Networking...) can be fully automated with ansible.
- Through the tight integration with OpenShift, Red Hat Virtualization allows you to see the **containers** running on the application, infrastructure and master nodes
- The OpenShift Container Platform can be **deployed** on RHV via a **single button push** through the tight integration of **ansible** and RHV
- New in OpenShift 3.7 Ansible Playbook Bundles can be used to build container applications and consume them through the **Ansible Service Broker** in the OpenShift service catalog

WRAP UP

ADDITIONAL INFORMATION

Have you used **Ansible** already? Try Tower for free:

- [ansible.com/tower-trial](https://www.ansible.com/tower-trial)

Would you like to learn Ansible? It's easy to get started:

- [ansible.com/get-started](https://www.ansible.com/get-started)

Want to learn more?

- [ansible.com/whitepapers](https://www.ansible.com/whitepapers)

Red Hat Virtualization evaluation:

- <https://access.redhat.com/products/red-hat-virtualization/evaluation>

Blogs:

- RHEL Blog
 - <http://rhelblog.redhat.com>
- Captain KVM
 - <http://CaptainKVM.com>

Product page:

- <http://www.redhat.com/rhv>

Documents:

- <https://access.redhat.com/documentation/en/red-hat-virtualization>

Complete documentation (upstream) for **oVirt Ansible modules**

- http://docs.ansible.com/ansible/list_of_cloud_modules.html#ovirt

Code base and documentation (upstream) **oVirt Ansible roles**

- <https://github.com/oVirt/ovirt-ansible>





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