Delivering Red Hat OpenShift at Ease on Red Hat OpenStack and RHV

Subheading goes here

Francesco Vollero - Specialist Solution Architect OpenStack
Natale Vinto - Specialist Solution Architect OpenShift
9 May 2018
INSERT DIVIDER COPY
INTRODUCTION
OpenShift on OpenStack: Integrating projects to deliver value to users
Integrating projects multiplies value

In recent years, we’ve seen many huge successes for collaborative development of open source software in upstream communities.

Integrations of open source projects to solve real-world problems are an extra layer of complexity.

Bringing projects together can have a powerful effect, combining the best of multiple projects to deliver more capabilities to users.
The challenge is to reach out

People, understandably, become very invested in the projects that they put their time and effort into. That passion and commitment is the engine of open source development. But, a shared sense of identity, and a shared purpose that holds an upstream community together, can end up being an obstacle to integration.

The challenge to all of us, is to reach out, to encourage a diverse, inclusive, culture which celebrates difference.

We should build bridges, not walls
Users are almost always integrators

It’s possible for individual contributors to upstream projects, to take a narrow view, and to focus all their attention on their favourite project. It might be a bit self-defeating, but it’s possible.
However, it isn’t possible for our users to do that. They have to solve the problems of integrating across various hardware types, across applications from multiple vendors, and from upstream communities etc..
We’re pushing all of that hard work onto our users, unless we join them in solving integration problems, and unlocking extra functionality by doing so.
EXPOSITION AND CONSUMPTION OF RESOURCES
“Greater than the sum of the parts”

- OpenShift is benefitting from TripleO’s use of Ironic to automate inspection and deployment of hardware, bringing a data centre under centralised control.
- OpenShift is benefitting from running on baremetal (or VMs, if you prefer) which are allocated to users on demand, as a service. The users can have quotas, can be billed by the minute etc. When the users are done, they just “delete” the bare-metal machines and walk away.
- OpenStack is benefiting from the world’s leading container orchestration engine being seamlessly integrated with the cloud resources it offers.
- Above all, users are benefitting from a more flexible, manageable, feature-rich platform.
The integration we’re showcasing today uses OpenStack to serve up physical servers, not VMs, to cloud users, on demand.

This means that:

- Users can run their containerised applications directly on real hardware, rather than a hypervisor, which maximises performance.
- OpenStack can still provision machines on-demand, can support scaling out OpenShift once it is deployed, and can support dynamic storage volume allocation etc.
- OpenStack is turning the machines that OpenShift runs on into an adaptive, self-service environment.

In the demonstration we’re about to see, the multi-container application that’s
ManageIQ and Kuryr: Integration enablers

ManageIQ is an open source management platform for Hybrid IT. It can manage small and large environments, and supports multiple technologies such as virtual machines, public clouds and containers.

With ManageIQ you will be able to:

- Continuously discover the latest state of your environment.
- Implement self service for your end users.
- Enforce compliance across the environment.
- Optimize the performance and utilization of your environment.

Kuryr is a bridge between layers of software-defined networking. It integrates the layers and avoids costly performance impact.
DEPLOYMENT PLANNING

Network topology
Service parameters
Resource capacity

DEPLOYMENT

Pre-flight checks/validations
Deployment orchestration
Service configuration

OPERATIONS

Major version upgrades
Applying minor updates
Scaling up and down
Ironic, the bare metal hypervisor

Ironic is a hypervisor for physical (non-virtual) machines, with a REST API

It provides:

- Hardware discovery
- Hardware inspection
- Ready state management
- Provisioning & lifecycle management

We’ll be seeing it again, because it is used to turn our initial racks of machines into OpenStack infrastructure and we’ll be using it shortly to serve bare metal machines to users.
OpenStack turns a set of machines into IaaS
OPENSHIFT DEPLOYMENT

- OpenShift running on OpenStack
- Baremetal and VMs together
- Kuryr for networking
- Drive with ManageIQ
DEPLOYMENT PROCESS

ManageIQ
  openshift-ansible
    ansible-playbook
      provision.yml
        Call OpenStack APIs
          OpenStack resources
      install.yml
        OpenShift cluster
PROVISIONING
INSTALLATION
OPENSHEET ON OPENSTACK

Containers, Virtual Machines, and Bare-metal
NETWORKING COMPONENTS

- LBaaSv2: perform CRUD actions
- Neutron Agent
- Kuryr Controller: watch CRUD events, annotate resources
- VM App
- Kuryr CNI: eth0.x, ovs br-int
- OpenShift node
- Pods
- OpenShift API Server
- Compute Node
BAREMETAL WORKER NODES

Worker C - OpenStack tenant ironic node

redis-master

eth0

tap-xx

pod subnet tag

redis-slave

eth0

tap-xx

VM subnet tag

kubelet

OvS integration bridge
VM WORKER NODES

Compute 1

Frontend-A
eth0.4

Frontend-B
eth0.1

Virtual Machine

OvS trunk bridge

OvS integration bridge

db1-xx
spi-xx

pod subnet tag

VM subnet tag
OPENSHIFT SERVICES

Diagram:
- Internet
- Tenant router
- Frontend service
  - LB
  - 8080 listener
  - Pool
- Compute node 0
  - Worker A
    - Pod
    - Pod
  - Worker B
    - Pod
We’re delivering an application stack to users which can...

- Discover and inspect hardware, managing hardware state and automating OS and application provisioning, bringing a data centre under centralised control.
- Provision infrastructure on-demand to users, including bare metal. The users can have quotas, can be billed by the minute etc. When the users are done, they just “delete” the bare-metal machines and walk away.
- Can orchestrate containers, with rich automation capabilities, ranging across virtual and bare metal machines, with integrated networking.
- Expand the users’ infrastructure on demand.

“In closing, integrations are hard, but the benefits can be huge.”
From CloudForms to OpenShift (provision)
From CloudForms to OpenShift (install)
OPENS SHIFT ON OPENSTACK

Containers, Virtual Machines, and Bare-metal
VM WORKER NODES

Compute 0

Pod1
eth0.42
15.0.0.17/24
worker node A

Pod2
eth0.40
15.0.0.18/24

ovs tbr-a9381a34-4
tag: 42
spt-09fe7521-1d
tap6ce88405-01
tpt-6ce88405-01

ovs br-int
spi-09fe7521-1d
spi-2e20acdb-92

pod subnet tag: 19
compute node

VM subnet tag: 3
OPENSTACK NETWORKING FOR OPENShift

Neutron resource usage

- Neutron subnets and ports:
  - Worker node connectivity
  - Pod IPAM & connectivity
  - Service networking
- Neutron Floating IPs
  - Cloud Load balancer IPs
- Neutron Load balancer as a Service
  - ClusterIP services
  - Load balancer services
- Neutron Routers
  - Worker node to Pod communication
  - Service - Pod communication
NETWORKING COMPONENTS

VM Node:
OpenShift <-- Kuryr <-- Neutron
(overcloud) [stack@hp-dl360g9-01 ~]$ openstack subnet list -c Name -c Subnet | grep -E 'ansible\|public'
| openshift-ansible-openshift.example.com-pod-subnet | 10.11.0.0/16 |
| public-subnet | 10.11.0.0/16 |
| openshift-ansible-openshift.example.com-service-subnet | 172.16.0.0/16 |
| openshift-ansible-openshift.example.com-subnet | 192.168.99.0/24 | 
| provisioning-subnet | 10.37.168.0/26 |

(overcloud) [stack@hp-dl360g9-01 ~]$ openstack server list -f value --long | grep -E 'master\|bm-app-node'
| Name | Status | Image | Created | Started | MemoryMb | Vcpus | MemoryGb | Vcpu | RootDevice | RootSize | RootDeviceType | RootFormat | Disks | Disks.
| Name | Status | Image | Created | Started | MemoryMb | Vcpus | MemoryGb | Vcpu | RootDevice | RootSize | RootDeviceType | RootFormat | Disks | Disks.
| Name | Status | Image | Created | Started | MemoryMb | Vcpus | MemoryGb | Vcpu | RootDevice | RootSize | RootDeviceType | RootFormat | Disks | Disks.

(overcloud) [stack@hp-dl360g9-01 ~]$ ssh openshift@10.37.151.200
Last login: from hp-dl360g9-01.lab.eng.brq.redhat.com

[openshift@master-0 ~]$ ip -a show dev eth0
2: eth0: <BRIDGE,MULTICAST,UP,LOWER_UP> mtu 1650 qdisc pfifo_fast state UP qlen 1000
inet 192.168.99.11/24 brd 192.168.99.255 scope global dynamic eth0
   valid_lft 68457sec preferred_lft 68457sec

[openshift@master-0 ~]$ oc get nodes -l type=baremetal
| NAME | STATUS | AGE | VERSION |
| NAME | STATUS | AGE | VERSION |
| NAME | STATUS | AGE | VERSION |

[openshift@master-0 ~]$ oc get pod -n wide
| NAME | READY | STATUS | RESTARTS | AGE | IP | NODE |
| NAME | READY | STATUS | RESTARTS | AGE | IP | NODE |
| NAME | READY | STATUS | RESTARTS | AGE | IP | NODE |

(overcloud) [stack@hp-dl360g9-01 ~]$ openstack port list -c ID -c Name -c "Fixed IP Addresses" -f value | awk "BEGIN { format = "%s %s %s" } /^Kubelet/ { $2 = substr($2, 1, 60); printf format, $1, $2, $3}"
4100f122-e2ac-46fa-8fc3-fe8cad522fcf
openshift.example.com-baremetal_compute_nodes=4w0ynv0xg7w
ip_address=192.168.99

(overcloud) [stack@hp-dl360g9-01 ~]$
OPENSHIFT SERVICES
THANK YOU

plus.google.com/+RedHat
linkedin.com/company/red-hat
facebook.com/redhatinc
twitter.com/RedHat
youtube.com/user/RedHatVideos
CUSTOMIZATION INSTRUCTIONS
To make a copy of this deck for your use, go to "File" > "Make a copy" > and save to your own Google Drive.

PRESENTATION RESOURCES
For help getting started with presentations, check out the official Red Hat Presentation Guide.

NEED HELP?
If you have any questions about your session content or using the speaker portal, contact presenters@redhat.com.