Kubernetes with Terraform, Ansible and OpenShift on OpenStack and Anywhere

(QuadrupleO: OpenShift Origin On OpenStack)

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OpenStack Cologne / Cloud Cologne Meetup
Agenda

- Organizational Topics / Meetups / Events in 2017
- Introduction to Kubernetes, OpenShift Origin, Terraform and Ansible.
- OpenShift Origin On OpenStack (QuadrupleO)
- How to run multiple Kubernetes Clusters with OpenShift (Origin) anywhere
- Get the Terraform code and start open shifting with QuadrupleO
- Demo: Run Rancher and the IoT OCP App on OpenShift
Organizational Topics & Events

- Most of our Meetups in 2017 will be held through Online Meetings
- The OpenStack DACH e.V. association annual general meeting will take place on March 2nd in Berlin by WeWork (new members are more than welcome to join)
- Openshift Commons Gathering on March 28. March in Berlin
- CloudNativeCon + KubeCon on March 29. + 30. in Berlin
Speakers + Sponsors Welcome

- For our upcoming meetups we’re seeking cloud-native speakers for great talks
- New Sponsorship Program for OpenStack Cologne and Cologne Cloud Meetup Groups available soon
- Please get in touch if you’d like to support us with Talks and Sponsorship
Desired Topics for our 2017 Sessions

- Topics which might be of our interest:
  - Serverless: Kubeless / Funktion / OpenWhisk
  - Container Run Times
  - Mesos / Mesosphere
  - Docker Data Center
  - Rancher / Cattle
  - CoreOS / Tectonic
  - Cloud-Native OpenStack
  - Kubernetes-X / OpenShift-X / Cloud Foundry
About Kubernetes (a.k.a. K8S or Kube)

- Google’s Container Cluster Manager under the Umbrella of CNCF (cloud native computing foundation)
- Provides a REST API to describe the desired state of applications, deploys group of Pods, replicates Pods, redeployes Pods if they fail, provides service discovery, auto-scaling, etc..
- Helps to build resilient, reliable, scalable and self-healing applications ANYWHERE
- ANYWHERE == Bare Metal, OpenStack, CloudStack, AWS, GCP / GCE, Azure, ...
Kubernetes Architecture

Master Nodes (Control Plane)
- API Server
- Replication Controller
- Scheduler

Worker Nodes
- Kube-Proxy
- Kubelet
- Pod container
- Pod container

Internet

Docker-Rkt-Engine
Kubernetes / OpenShift vocabulary

- Pods
- Replication Controller
- Services
- Secrets
- Deployment Config
- ConfigMap
- Lables
- Annotations
- Router (HAProxy)
- Registry (Docker Image Registry)
OpenShift Intro (I)

- OpenShift is Red Hat’s Container Platform built on top of K8S
- Turns K8S into a PaaS
- Adds additional tools and services that provide CI / CD and **Continuous Operation** to apply the DevOps Principles and achieve NoOps for developers
- OpenShift is **one of** the Enterprise Grade Kubernetes Implementations
- Hides some K8S complexities and adds some new complexities ;-)
OpenShift Intro (II)

- OpenShift comes with different flavors:
  - Online
  - Enterprise (3.4)
  - Dedicated
  - Origin (1.4)

- Origin is the upstream project of OpenShift
  - Runs ANYWHERE (on RHEL family)
  - Helps to build your OWN enterprise grade K8S Implementation

- Origin comes with great community support
OpenShift (Kubernetes Platform :-))

Source: https://docs.openshift.org/latest/architecture/index.html
What does OpenShift add to K8S?

- Source code management, source to image builds (S2I), and a large set of builder images and quick starts
- Managing and promoting images at scale as they flow through your system
- Flexible deployment models: rolling, blue/green and load balancing for A/B testing
- Team and user tracking for organizing a large developer organization

Source: https://docs.openshift.org/latest/architecture/index.html
What does OpenShift Enterprise add to Origin

- Enterprise Grade Support
- Enterprise version lags behind Origin in favor of stability
- Some Application templates and utilities come as part of packages for RHEL users
- In short: stability over early adoption
- From our experience Origin is stable enough for DEV / Test and even for Production if you can afford to support it on your own or through community support!
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STORAGE PLUGINS
- Docker-Engine
- Plugable SDN
- Atomic Registry
Customized CI / CD, extend OpenShift

- With **OpenShift Pipeline** Jenkins Plugin
  - Create Pipeline BuildConfig
  - Jenkins auto-provisioning
  - Web Console Visualization
- Have a look on [farbric8.io](http://farbric8.io), the Integrated Development Platform for K8S / OpenShift
- Don’t miss: [Fabric8 OpenShift Manifests](http://fabric8.io)
About Ansible

- Ansible is Red Hat’s Automation Engine that automates Cloud Provisioning through Configuration Management, Application Deployment and Infra Orchestration
- Uses YAML to describe automation jobs through easy to write Inventory files and PlayBooks
- Supports continuous deployments with zero downtime rolling updates
About Terraform

- Terraform is HashiCorp’s Infrastructure Orchestration Tool that helps to describe the **desired state** of the infrastructure in declarative way!
- Deploys groups of resources (e.g. Bare Metal, VMs, Containers, Networks, Nat Gateways, Loadbalancers, etc..)
- Uses HCL (HashiCorp Configuration Language) to describe the desired state of your infrastructure
- Terraform is Cloud Agnostic, helps to avoid Heat- or CloudFormation- Lock-In → DEMO
Terraform DEMO on OpenStack & AWS
QuadrupleO

- **OpenShift Origin** on **OpenStack**
- Uses OpenStack RDO with CentOS 7.3 Golden Images
- **DEMO on OpenStack**
- Read the full story and get the guide:
  - [https://goo.gl/VQT9T4](https://goo.gl/VQT9T4)
  - [https://goo.gl/gbnMDD](https://goo.gl/gbnMDD)
- Known Issues with Origin:
  - Exited containers and dangling images do not get purged automatically
  - Persistent Volumes with NFS is not stable
  - Cinder Integration didn’t worked out of the box for us
Run OpenShift ANYWHERE

- OpenShift Container Platform Reference Architecture Implementation Guides
  - Deploying on Red Hat OSP
  - Deploying on Amazon Web Services
  - Deploying on Google Cloud Engine
  - Deploying on VMware vCenter
  - Deploying on Microsoft Azure is targeted to release in February 2017

Source:
https://blog.openshift.com/openshift-container-platform-reference-architecture-implementation-guides/
Questions to ask

- Why OpenShift and not pure Kubernetes?
- Why OpenShift On OpenStack?
- Why not running OpenShift on Bare Metal?
- Why not just using OpenShift dedicated on GCE or use GKE?
- Why not AppScale / Cloud Foundry / Magnum / Rancher / Tectonic, etc. as alternatives?
References / Books

- OpenShift Origin Docs
- Free OpenShift eBook (for developers)
- The TerraformBook.com
- QuadrupleO
- OpenShift 3.3 Pipelines – Deep Dive
- Blog post: OpenShift makes Kubernetes more Exciting
Last but not least

- Thinking about Cloud-Native OpenStack:
  - to run OpenStack On OpenShift with Kolla Containers
  - or go with [OpenStack-Helm](https://openstack-helm.io) project (initiated by AT&T)
Q&A
Thank You for Your attention!