Certified Kubernetes Administrator Prep

Designing a Kubernetes Cluster

Design

- This can be a huge topic, and while it's important to review, it is not a major component of the Certified Kubernetes Exam, so we're going to take a high-level overview of the decisions and planning that goes into creating a kubernetes cluster.
- Choosing the right solution is, obviously, of paramount importance.
- If you're learning k8s or just want to kick the tires, you can use the kubernetes cluster.
- Provided to you through Linux Academy and the labs you've already done prior to this lesson.
- Alternatively, you can use minikube.

Minikube

- Minikube is the recommended method for creating a single node kubernetes deployment on your local workstation.
- Its installation is automated and doesn't require a cloud provider, and it works pretty well.
- I played with minikube a lot while I wrote this course and can definitely recommend it on Linux, Mac OS X, and Windows!

Kubeadm

- You can use Kubeadm to deploy multi-node locally if you like, but it's a little more challenging.
- This is the method we used in the lab to get your Linux Academy Kubernetes Cluster up and running, so you already have a little experience with this.
- You'll need to select your own CNI (Cluster Network Interface) if you go this route.
- You'll recall we used Flannel in our lab, and I can say it's pretty stable and good for learning.

Ubuntu

- Ubuntu on LXD also provides a nine-instance supported kubernetes cluster on localhost.
  - If you're enjoying this course, I also did a quick LXD deep dive here at Linux Academy if you're interested in learning more about that technology.

- If you have a cloud provider, chances are they also support kubernetes.

- Google, Azure, Stackpoint, AppCode, KUBE2GO, MadCore, Platform 9, OpenShift Dedicated, OpenShift Online, IBM cloud container service, and Giant Swarm currently offer hosted solutions on Kubernetes.

Turnkey Solutions

There are also a variety of turnkey solution providers for kubernetes allowing you to get up and running with just a command or two including:

Conjure-up Kubernetes with Ubuntu on AWS, Azure, Google Cloud, Oracle Cloud
Google Compute Engine (GCE), AWS, Azure, Tectonic by CoreOS, CenturyLink Cloud,
IBM Cloud, Stackpoint.io, KUBE2GO.io, as well as Madcore.Ai

Add-on Solutions

- Vendors also offer a wide variety of add-ons to k8s. One of the most important ones to consider is the CNI -- Container Networking Interface. Some CNIs include:
  - Calico is a secure L3 networking and network policy provider.
  - Canal unites Flannel and Calico, providing networking and network policy.
  - Cilium is a L3 network and network policy plugin that can enforce HTTP/API/L7 policies transparently. Both routing and overlay/encapsulation mode are supported.
  - CNI-Genie enables Kubernetes to seamlessly connect to a choice of CNI plugins, such as Calico, Canal, Flannel, Romana, or Weave.

Contiv

- Contiv provides configurable networking (native L3 using BGP, overlay using vxlan, classic L2, and Cisco-SDN/ACI) for various use cases and a rich policy framework.
- Contiv project is fully open sourced.
- The installer provides both kubeadm and non-kubeadm based installation options.

Flannel and Multus Solutions

- Flannel is an overlay network provider that can be used with Kubernetes, and is the one we're using in our Linux Academy servers

- Multus is a Multi plugin for multiple network support in Kubernetes to support all CNI plugins (e.g. Calico, Cilium, Contiv, Flannel), in addition to SRIOV, DPDK, OVS-DPDK and VPP based workloads in Kubernetes.

Other Solutions

- NSX-T Container Plug-in (NCP) provides integration between VMware NSX-T and container orchestrators such as Kubernetes

- Also provides integration between NSX-T and container-based CaaS/PaaS platforms such as Pivotal Container Service (PKS) and Openshift.

Other Solutions

- Nuage is an SDN platform that provides policy-based networking between Kubernetes Pods and non-Kubernetes environments with visibility and security monitoring.
- Romana is a Layer 3 networking solution for pod networks that also supports the NetworkPolicy API.
- Weave Net provides networking and network policy, will carry on working on both sides of a network partition, and does not require an external database.
- There are also add-ons for service discovery and visualization and control, like the dashboard.

Conclusion

- In this lesson, we've gone over some of the options to be considered when designing a new Kubernetes cluster.

- A lot depends on what sort of workloads will be run on the cluster and whether it needs to be production quality or will be used as a lab.