**Deploy Your First Kubernetes Cluster**

**Cluster Creation**

**Summary**

Provisioning a Kubernetes cluster is known as the bootstrapping process. When creating a cluster, it is essential to ensure that each node had the necessary components installed. It is possible to manually provision a cluster, however, this implied the distribution and execution of each component independently (e.g. kube-apiserver, kube-scheduler, kubelet, etc.). This is a highly tedious task that has a higher risk of misconfiguration.

As a result, multiple tools emerged to handle the bootstrapping of a cluster automatically. For example:

* Production-grade clusters
  + [kubeadm](https://kubernetes.io/docs/setup/production-environment/tools/kubeadm/install-kubeadm/)
  + [Kubespray](https://github.com/kubernetes-sigs/kubespray)
  + [Kops](https://github.com/kubernetes/kops)
  + [K3s](https://k3s.io/)
* Developmnet-grade clusters
  + [kind](https://kind.sigs.k8s.io/docs/user/quick-start/)
  + [minikube](https://minikube.sigs.k8s.io/docs/start/)
  + [k3d](https://classroom.udacity.com/nanodegrees/nd064-1/parts/30cb07da-8fd4-4438-a209-b3457adb5d82/modules/7b21dfa4-aac8-4d24-82c5-65325e6dc691/lessons/d9fa86b3-301d-4966-86f8-a2f34a5a7ca3/concepts/link%20to%20https:/k3d.io/)

A good introduction to k3d, written by k3d's creator Thorsten Klein, can be found [here](https://www.suse.com/c/introduction-k3d-run-k3s-docker-src/)

A comprehensive overview of currently existing lightweight kubernetes distros can be found [here](https://www.suse.com/c/running-a-local-kubernetes-cluster-k3s-src)

**Create Vagrant Box And Install Kubernetes with k3s**

This demo is a step-by-step guide on how to create a vagrant box and install a Kubernetes cluster using [k3s](https://k3s.io/). To follow this demo, reference the [Vagrantfile](https://github.com/udacity/nd064_course_1/blob/main/exercises/Vagrantfile" \t "_blank) from the course repository.

A nice introduction to Vagrant can be found in [this article](https://community.suse.com/posts/vagrant-never-gets-old)

Before following the demo:

1. Make sure to have [VirtualBox](https://www.virtualbox.org/wiki/Downloads" \t "_blank) 6.1.16 or higher installed.
2. You also need to install [vagrant](https://www.vagrantup.com/) on your machine.

Throughout the demo, the following kubectl commands are used:

*# Inspect available vagrant boxes*

vagrant status

*# create a vagrant box using the Vagrantfile in the current directory*

vagrant up

*# SSH into the vagrant box*

*# Note: this command uses the .vagrant folder to identify the details of the vagrant box*

vagrant ssh

**New terms**

* **Bootstrap** - the process of provisioning a Kubernetes cluster, by ensuring that each node has the necessary components to be fully operational

**Further reading**

* [Bootstrapping clusters with kubeadm](https://kubernetes.io/docs/setup/production-environment/tools/kubeadm/) - a step-by-step guide on how to use kubeadm to provision a cluster