**What is Kubernetes? Write in your own words and why do we call it k8s?**

**What are the benefits of using k8s?**

**Explain the architecture of Kubernetes, refer to this video**

**What is Control Plane?**

**Write the difference between kubectl and kubelets.**

**Explain the role of the API server.**

1. Kubernetes is a container orchestration tool that manages containers inside a cluster and also handles automated deployment, scaling and healing of containerized applications. Kubernetes is also called K8s because the number of letters between K and s in the word is 8. Therefore, K8s.

2. Benefits of using K8s:

Autoscaling

Auto Healing

Load-balancing

Open-source and therefore its free

Platform Independent

Health monitoring of containers

Fault Tolerance, etc

3. The architecture of a K8s cluster consists of 2 parts namely the Control Plane and the Node. Now, the number of nodes can vary according to the user's requirements. The control plane works with 4 components and they are:

**API Server**: This is the entry point of the K8s cluster. It directly interacts with the user with the help of kubectl command. It also is responsible for scaling the server as per the load/traffic. In other words, the API server is the front end of the control plane.

**etcd**: It is the Kubernetes backing store. Stores metadata and status of the cluster.

**Scheduler**: This component ensures pod replacement in the node. It assigns the node(s) to create and run the pods.

**Controller Manager**: It keeps track of what's happening in the cluster.

Kubelet is the agent that runs on the node, carries out the job offered by the control plane and reports their status.

Container Engine works with the kubelet, pulls the images of the apps, starts and stops the containers and exposes the ports that are specified to run the application.

Kube-proxy assigns IP to each pod, it operates on the node and makes sure that each pod gets a unique port number.

These 3 components make up each node inside the K8s cluster.

The smallest unit in Kubernetes is the POD. It is a group of one or more containers that runs on the same host. Inside each pod, a container is created to run which is controlled by the control plane. It is advised to run one container on one pod, although multi-container pods are also created that share volume and space. The concept of PODs is used to support multiple processes that runs cohesively.

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5. kubectl is a “client-side” tool that can connect to a kubernetes cluster to read, create, modify well known kubernetes resources (like pod, deployment, services)

kubelet is a part of the kubernetes cluster (server) software. It runs on worker nodes of a kubernetes cluster. It sees what pods needs to be realized on a node and realizes them in the form of running docker containers. As such it talks a lot to the docker layer on the node.

6. The API server is a tool that allows you to build, manage, and deploy REST APIs. API Server is the entry point of the K8s cluster. It directly interacts with the user with the help of kubectl command. It also is responsible for scaling the server as per the load/traffic. In other words, the API server is the front end of the control plane.