Kubernetes

Terminologies

1. Cluster 🡪

* A cluster is a group of nodes that collectively run applications. The entire cluster, including all its components, is managed using Kubernetes.
* A cluster is made up of a master node and a set of worker nodes. While the control plane works to maintain the desired state of the cluster, the worker nodes actually run the applications and workloads.

1. Containers 🡪

* Containers are a software technology that bundles an application with its runtime dependencies, enabling it to run reliably across diverse environments.
* A common approach to containerization is running applications as microservices for scalability and reliability

1. Controller 🡪

* Control loops that watch the state of your cluster and request changes wherever needed, trying to move the current state closer to the desired state.
* Kubernetes already comes with built-in controllers that run inside the kube-controller-manager (for example the Deployment and Job controllers).

1. Daemon Set 🡪

* A component that makes sure a pod is running across a set of nodes in a cluster.
* A daemon set creates pods when a node is added, and garbage collects pods whenever a node is removed from a cluster.

### **Deployment 🡪**

### A deployment is an object that manages a replicated application, making sure to automatically replace any instances that fail or become unresponsive.

### Deployments help make sure that one (or more) instance of your application is available to serve user requests.

### Ingress 🡪

### Ingress is an API object allowing external access to your application outside the Kubernetes cluster.

### An Ingress controller is necessary to process this information and direct traffic into the Kubernetes cluster

### Wayfinder 🡪 Wayfinder is a cloud-based platform enabling the automation of development environments and security standards for teams using Kubernetes.

### Kubectl 🡪 A command line tool for communicating with a Kubernetes API server, used to create and manage Kubernetes objects.

### Kubelet 🡪

### Kubelet, an essential part of a Kubernetes cluster, ensures containers are running in pods via the Kubernetes API server.

### It also registers a node in the cluster and reports on resource utilization.

### Minikube 🡪

### A tool that runs a single-node cluster inside a Virtual Machine on your computer.

### You can use Minikube to test out Kubernetes in a learning environment.

### Namespace 🡪

### A virtual cluster where you can provision resources and provide scope for pods, services and deployments.

### They provide a scope for unique naming in order to divide cluster resources in an environment when there are several teams and/or projects.

### Node 🡪

### A node is a worker machine in Kubernetes - a workload is run by putting containers into pods which run on nodes.

### A node can be either a virtual or physical machine, depending on the cluster.

### Multiple pods can run on one node.

### You'll usually have several nodes on each clusteron each node you'll find the kubelet, kube-proxy and container runtime.

### Master Node: The master node is the central control plane of a Kubernetes cluster. It is responsible for managing the cluster and the various nodes in it. The master node consists of several components, including the API server, etcd, scheduler, and controller manager.

### Worker Node: Worker nodes are the machines (virtual or physical) where your applications are deployed and run. These nodes run the required services to execute the containers, such as container runtime and kubelet.

### ##The master node is allotted less resources as it has less work load

### Operators 🡪A way to make use of custom resources to create and manage applications and components.

### Pod 🡪The smallest object of the Kubernetes ecosystem, a Pod represents a group of one or more containers running together on your cluster. It is abstraction over containers. Creates a running environment or layer over the container. Each pod gets its own IP address. When a pod dies a new one is created in pace of it with a new IP address and this change in IP address to overcome this issue we use service.

### Service 🡪It is an static IP address that can be attached to each pod. Life cycle of pod and service is not related. An abstraction which defines a set of pods and makes sure that network traffic can be directed to the pods for the workload and hence acts as load balancer

### UIDs 🡪A name-string generated by Kubernetes to uniquely identify objects. Every object created in a Kubernetes cluster will have a particular UID.

### Etcd 🡪

### etcd is a distributed key-value store and the primary datastore of Kubernetes. It stores and replicates the Kubernetes cluster state.

### To run etcd, you first need to have a Kubernetes cluster and the command-line tool configured to communicate with said cluster.

### A diagram of a computer system Description automatically generated

### Q1. Need for Kubernetes

### Ans. Managing microservices through scripts in environments with numerous containers can be challenging. Kubernetes provides a solution by automating the management of clusters and applications.

### #When a pod dies(my-app) there will not be a down time for the user because another node with the connected service will be there to replace it. This replication is done using deployment.

### Q2. What is StatefulSet?

### Ans. StatefulSet is used when replicating databases or other stateful variables using Deployment might create inconsistencies. Kubernetes doesn't explicitly manage data persistence, and StatefulSets address this concern.

### # K8 doesn’t manage any data persistence explicitly we are responsible for manging and backing up data at local or cloud storage.

### Q3. What is miniKube?

### Ans. Minikube is a tool for testing Kubernetes, running master and worker node processes on a single machine. It provides a one-node Kubernetes cluster within a virtual box on a personal computer.

### Q4. What is Kubectl?

### Ans. Kubectl is a command-line tool designed for interacting with a Kubernetes API server. It plays a crucial role in creating and managing various Kubernetes objects.

### # Kubectl CLI is used for configuration of the Minikube cluster.

### #Minikube CLI is used for startup or deleting the cluster

### Q5. What is ReplicaSet?

### Ans. It is a controller responsible for maintaining a specified number of pod replicas, ensuring high availability and fault tolerance. Acting as an intermediary layer between deployments and indivi dual pods, the ReplicaSet continuously monitors the cluster, automatically adjusting the pod count to meet the desired state. It simplifies the management of pod instances, allowing for seamless scalability and efficient maintenance in a Kubernetes environment.

### #establisment of connection is done using labels and selectors. Metadata contains labels and specification contains selectors

### # --- means a new file is starting in yaml format. Using this we can have multiple configuration files in the same document.