

Kubernetes Interview Questions and Answers (Complete)

Q: What is Kubernetes?

A: Kubernetes is an open-source container orchestration platform for automating deployment, scaling, and management of containerized applications.

Q: What are the main components of Kubernetes architecture?

A: 1. Master Node (API Server, Scheduler, Controller Manager, etcd)

2. Worker Node (Kubelet, Kube-proxy, Container Runtime)

Q: What is a Pod in Kubernetes?

A: A Pod is the smallest deployable unit in Kubernetes that can contain one or more containers. All containers in a Pod share the same network namespace and storage.

Q: What is the difference between a Pod and a Container?

A: A container is a runtime instance of a container image. A Pod is a higher-level structure that may wrap one or more containers.

Q: What is a Node in Kubernetes?

A: A Node is a worker machine in Kubernetes where containers are deployed. It can be a VM or a physical machine.

Q: What is a Namespace and why is it used?

A: Namespaces are virtual clusters within a Kubernetes cluster, used to divide resources among multiple users or teams.

Q: What is a Kubelet?

A: Kubelet is an agent that runs on each worker node and ensures the containers are running in a Pod.

Q: What is the role of etcd in Kubernetes?

A: etcd is a distributed key-value store used as the Kubernetes backing store for all cluster data.

Q: What is the difference between Deployment and StatefulSet?

A: Deployment is used for stateless apps; StatefulSet is used for stateful apps with persistent identities and storage.

Q: How does Kubernetes achieve high availability?

A: By using multiple replicas of the control plane and pods, load balancing, health checks, and self-healing mechanisms.

Q: What is a ReplicaSet? How is it different from Deployment?

A: ReplicaSet ensures a specified number of Pod replicas are running. Deployment manages ReplicaSets and provides rolling updates.

Q: How does Horizontal Pod Autoscaling work?

A: It automatically scales the number of Pods based on CPU/memory usage or custom metrics.

Q: Explain the lifecycle of a Pod.

A: Pending -> Scheduled -> Running -> Succeeded/Failed. Kubernetes tracks Pod phases and restarts if needed.

Q: What are DaemonSets and when would you use them?

A: DaemonSets ensure a copy of a Pod runs on every node. Useful for logging or monitoring agents.

Q: What is a Job vs a CronJob in Kubernetes?

A: Job runs a task to completion. CronJob runs Jobs on a schedule (like cron).

Q: What is a Service in Kubernetes?

A: A Service exposes a set of Pods as a network service. It provides stable access to ephemeral Pods.

Q: Types of Services in Kubernetes?

A: ClusterIP, NodePort, LoadBalancer, and ExternalName. Each exposes Pods differently.

Q: What is Ingress?

A: Ingress manages external access to services, typically HTTP. It provides routing rules and SSL termination.

Q: What is a NetworkPolicy?

A: NetworkPolicy controls the network access between Pods at the IP and port level.

Q: What is kube-proxy and how does it work?

A: kube-proxy maintains network rules on nodes, routing traffic to appropriate Pods.

Q: What is a ConfigMap and how is it used?

A: A ConfigMap is used to store non-confidential configuration data as key-value pairs. It can be mounted as volumes or environment variables in Pods.

Q: What is a Secret in Kubernetes?

A: A Secret stores sensitive information, such as passwords, OAuth tokens, and SSH keys, in base64-encoded format.

Q: What is the difference between a PersistentVolume and a PersistentVolumeClaim?

A: A PersistentVolume (PV) is a piece of storage in the cluster. A PersistentVolumeClaim (PVC) is a request for storage by a user.

Q: What is a StorageClass?

A: StorageClass provides a way to describe different types of storage and allows dynamic provisioning of PersistentVolumes.

Q: How do you mount volumes in a Pod?

A: By specifying a `volumes` section in the Pod spec and mounting it into containers using `volumeMounts`.

Q: How does Kubernetes schedule a Pod?

A: The scheduler assigns Pods to nodes based on resource requirements, constraints, and policies like affinity or taints.

Q: What is taint and toleration in Kubernetes?

A: Taints prevent Pods from being scheduled on certain nodes unless they have matching tolerations.

Q: What is node affinity and pod affinity?

A: Node affinity is a rule for placing Pods on specific nodes. Pod affinity/anti-affinity controls Pod placement relative to other Pods.

Q: How can you monitor Pods in Kubernetes?

A: You can monitor Pods using tools like Prometheus, Grafana, and ``kubectl top pods``.

Q: How to view logs of a Pod?

A: Use the command ``kubectl logs <pod-name>`` to view logs of a running container.

Q: What are ServiceAccounts in Kubernetes?

A: ServiceAccounts provide identities for processes running in Pods to interact with the Kubernetes API.

Q: How do RBAC roles work in Kubernetes?

A: RBAC (Role-Based Access Control) uses Roles and RoleBindings to define who can perform what actions on which resources.

Q: What is a PodSecurityPolicy?

A: A PodSecurityPolicy defines a set of conditions that a Pod must meet to be accepted into the system.

Q: How do you secure secrets in Kubernetes?

A: Store them as Secrets, use RBAC to restrict access, and consider external secret managers like Vault.

Q: How to restrict access to a namespace?

A: Use RBAC to assign roles with limited permissions scoped to a specific namespace.

Q: What is a Custom Resource Definition (CRD)?

A: A CRD allows users to create their own resource types and extend Kubernetes functionality.

Q: What is Helm and how does it work with Kubernetes?

A: Helm is a package manager for Kubernetes. It uses charts to define, install, and upgrade applications.

Q: Explain how you would upgrade a Kubernetes cluster.

A: Upgrade the control plane components first (API server, etcd), then upgrade the kubelet and kube-proxy on worker nodes.

Q: What is the difference between RollingUpdate and Recreate deployment strategies?

A: RollingUpdate updates Pods gradually with zero downtime, while Recreate terminates all Pods before starting new ones.

Q: How does Kubernetes handle configuration drift?

A: The control plane continuously reconciles the actual state with the desired state defined in manifests.

Q: A Pod is stuck in CrashLoopBackOff, how do you debug it?

A: Use ``kubectl logs``, check container exit codes, and describe the Pod with ``kubectl describe pod <name>``.

Q: How do you check why a Pod is not getting scheduled?

A: Use ``kubectl describe pod <name>`` to check for events like node affinity, taints, or resource constraints.

Q: What happens if etcd goes down?

A: The cluster becomes read-only. No new changes can be made until etcd is restored.

Q: How do you rollback a Deployment in Kubernetes?

A: Use ``kubectl rollout undo deployment/<name>`` to revert to the previous version.

Q: What is the difference between readinessProbe and livenessProbe?

A: readinessProbe checks if the Pod is ready to serve traffic. livenessProbe checks if the Pod is alive and restarts it if it fails.