Here are some advanced Kubernetes (k8s) interview questions to test deep technical knowledge:

**Cluster Architecture & Networking**

1. How does Kubernetes handle service discovery internally? Explain how CoreDNS interacts with services.
2. What happens internally when a pod is scheduled on a node? Walk through the process step by step.
3. How does Kubernetes handle network isolation between namespaces? Can a pod in one namespace communicate with a pod in another?
4. Explain how CNI (Container Network Interface) works in Kubernetes. How does it differ from kube-proxy?
5. What is the difference between NodePort, LoadBalancer, and ClusterIP services? How does each work internally?
6. How does Kubernetes ensure High Availability (HA) of the control plane? What components are involved?

**Scheduling & Workloads**

1. Explain how the Kubernetes scheduler decides which node to place a pod on. What factors does it consider?
2. What are Pod Disruption Budgets (PDB), and how do they impact rolling updates?
3. Describe the difference between StatefulSets and Deployments. In which scenarios would you use each?
4. How does Kubernetes handle workloads in an environment where nodes have different CPU and memory capacities?
5. What are Taints and Tolerations, and how do they affect pod scheduling?

**Storage & Persistent Volumes**

1. What is the difference between a PersistentVolume (PV) and a PersistentVolumeClaim (PVC)?
2. How does Kubernetes dynamically provision storage? Explain how Storage Classes work.
3. What happens if a node with a pod that has a Persistent Volume crashes? How does Kubernetes handle data recovery?
4. Explain the difference between ReadWriteOnce, ReadWriteMany, and ReadOnlyMany access modes in Kubernetes storage.

**Security & Authentication**

1. How does Kubernetes handle RBAC (Role-Based Access Control)?
2. What is a ServiceAccount, and how does it differ from a User in Kubernetes?
3. How can you secure Kubernetes API access using certificates and authentication tokens?
4. Explain how Network Policies work. How would you block external traffic but allow intra-cluster communication?
5. What are Pod Security Standards (PSS), and how do they differ from Pod Security Policies (PSP)?

**Scaling & Performance Optimization**

1. How does Kubernetes handle auto-scaling? Explain the difference between HPA (Horizontal Pod Autoscaler) and VPA (Vertical Pod Autoscaler).
2. How do you optimize Kubernetes workloads for high throughput and low latency?
3. What is the role of kube-proxy in Kubernetes networking, and how does it affect performance?
4. How do you debug and troubleshoot a slow Kubernetes cluster? What tools would you use?
5. What are the best practices for running high-performance applications in Kubernetes?

**Disaster Recovery & Troubleshooting**

1. How does Kubernetes handle a scenario where an entire node fails?
2. What is etcd in Kubernetes? How does Kubernetes recover from an etcd failure?
3. How do you investigate and fix a Kubernetes pod stuck in a CrashLoopBackOff state?
4. How do you perform a backup and restore of a Kubernetes cluster?
5. What happens if all Kubernetes control plane nodes go down? How do you recover?

Would you like a deep dive into any of these? 🚀