SRE + Kubernetes Scenario-Based Questions & Answers

1. Pods Running But Service Not Accessible

Problem: Application pods are running, but users cannot access the service.

Investigation:

- kubectl get endpoints → No endpoints found
- Service selector mismatch with pod labels
- kubectl describe svc to confirm labels

Remediation:

- Correct service selectors to match pod labels
- Apply updated YAML and verify connectivity

2. Persistent Volume Attached But Application Failing

Problem: Pod starts but application throws 'Read-only filesystem' error.

Investigation:

- kubectl describe pod → Check PVC mount
- StorageClass provisioner may be read-only
- Check CSI driver logs for attach errors

Remediation:

- Use RWX-capable storage class (e.g., NFS, EFS)
- Update PVC spec and re-deploy

3. Liveness Probe Causing Pod Restarts

Problem: Pods keep restarting due to liveness probe failure.

Investigation:

- kubectl describe pod → Events show probe failed
- Check endpoint inside pod: kubectl exec -- curl localhost:/healthz
- Probe timeout < actual response time

Remediation:

- Adjust initialDelaySeconds, timeoutSeconds
- Fix health endpoint logic in app

4. Canary Deployment Receiving All Traffic

Problem: Canary pod unexpectedly gets 100% traffic.

Investigation:

- Istio/NGINX ingress misconfiguration
- kubectl get virtualservice or ingress annotations

Remediation:

- Correct traffic-splitting rules (e.g., Istio weight, NGINX canary annotations)
- Add monitoring to validate rollout

5. Cluster Autoscaler Not Scaling Up

Problem: Pods stuck in Pending state, no nodes scaling.

Investigation:

- kubectl describe pod → Insufficient CPU/memory
- Check cluster-autoscaler logs
- Node pool limits exceeded

Remediation:

- Increase maxNodes in autoscaler config
- Add larger node type to node pool

6. CrashLoopBackOff After Config Change

Problem: After new config rollout, pods go into CrashLoopBackOff.

Investigation:

- kubectl logs → App failing on startup
- ConfigMap mounted but invalid values

Remediation:

- Rollback to previous config: kubectl rollout undo deployment
- Add config validation pipeline before rollout

7. Secrets Not Mounted Into Pod

Problem: Pod fails with 'Missing credentials' though secret exists.

Investigation:

- kubectl describe pod → VolumeMount/EnvFrom missing
- Secret in different namespace
- RBAC restrictions

Remediation:

- Ensure secret in correct namespace
- Update deployment to mount env/volumes correctly
- Verify with kubectl exec -- env

8. Pod Scheduling Stuck Due to NodeSelector

Problem: Pod Pending with 'no matching nodes.'

Investigation:

- kubectl describe pod → NodeAffinity unsatisfied
- Labels missing on nodes

Remediation:

- Add labels to nodes: kubectl label node disktype=ssd
- Or adjust pod affinity rules

9. Horizontal Pod Autoscaler Scaling Erratically

Problem: Pods scale up and down too aggressively.

Investigation:

- Check metrics-server availability
- Prometheus adapter misconfigured
- High CPU spikes in app logs

Remediation:

- Add stabilization window in HPA spec
- Use custom metrics for smoother scaling

10. Expired TLS Certificates Causing Downtime

Problem: Ingress controller routes failing with SSL errors.

Investigation:

- kubectl describe secret → Expired cert
- Logs show handshake errors

Remediation:

- Automate cert renewal with Cert-Manager + ACME
- Setup Prometheus alert for cert expiry

11. ImagePullBackOff Due to Private Registry

Problem: Pods stuck in ImagePullBackOff state when pulling images.

Investigation:

- kubectl describe pod → ImagePull error
- Check imagePullSecrets in deployment spec
- Verify Docker registry credentials

Remediation:

- Create secret: kubectl create secret docker-registry
- Add imagePullSecrets to service account or deployment

- Validate credentials with docker login

12. API Server Under High Load

Problem: Cluster becomes slow due to API server overload.

Investigation:

- Check metrics: apiserver_request_duration_seconds
- kubectl top pods -n kube-system
- Audit frequent API calls from controllers/users

Remediation:

- Scale control plane nodes (self-managed)
- Reduce frequent list/watch calls
- Implement caching in controllers

13. Node Not Joining Cluster

Problem: Newly created node not joining cluster.

Investigation:

- Check kubelet logs on node
- Verify bootstrap token validity
- Firewall or network restrictions

Remediation:

- Regenerate kubeadm join token
- Open required ports (6443, 10250)
- Restart kubelet service

14. High Disk Usage on Nodes

Problem: Node disk pressure causing pod evictions.

Investigation:

- kubectl describe node → DiskPressure
- Check /var/lib/docker or containerd logs
- Large logs in /var/logs

Remediation:

- Enable log rotation
- Use emptyDir with sizeLimit
- Monitor disk with node-exporter

15. ConfigMap Updates Not Reflected

Problem: Pods not picking up latest ConfigMap changes.

Investigation:

- kubectl describe pod → Mounted config version
- Check if deployment rollout triggered
- App does not reload config automatically

Remediation:

- Trigger rollout: kubectl rollout restart deployment
- Use sidecar (e.g., reloader) to detect changes
- Implement in-app config reload logic

16. DaemonSet Pods Not Running on All Nodes

Problem: Some nodes missing DaemonSet pods.

Investigation:

- kubectl get daemonset -o wide
- kubectl describe node → Taints
- Pod tolerations missing

Remediation:

- Add tolerations to DaemonSet spec
- Remove unnecessary taints from nodes
- Validate node selectors

17. Service Mesh Sidecar Not Injected

Problem: Pods not getting Istio/Linkerd sidecar.

Investigation:

- kubectl describe pod → No sidecar
- Namespace missing istio-injection=enabled label
- Admission webhook errors

Remediation:

- Label namespace: kubectl label ns istio-injection=enabled
- Check sidecar injector logs
- Restart deployment

18. Node Clock Skew Causing Issues

Problem: Pods fail authentication due to time drift.

Investigation:

- kubectl logs auth service
- Check node system clock
- Compare with NTP server

Remediation:

- Enable NTP or chrony on all nodes
- Monitor clock skew with node-exporter
- Restart affected pods

19. Webhook Admission Failures

Problem: Deployments fail due to webhook errors.

Investigation:

- kubectl describe pod → Admission webhook deny
- Check webhook service logs
- TLS cert expired for webhook service

Remediation:

- Update webhook certs
- Ensure webhook service healthy
- Patch failing rules or policies