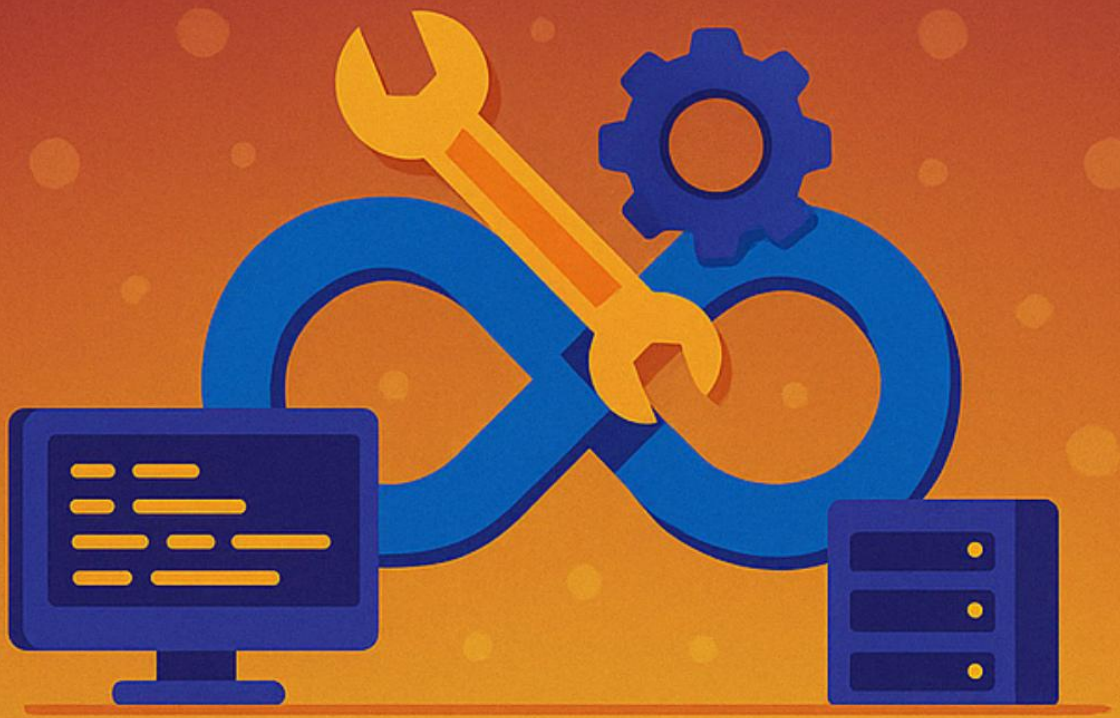
Devops Shack

Real DevOps Questions

Asked In Interview Answered



By DevOps Shack

Click Here for DevOps & DevSecOps BootCamp

DevOps Questions Asked In Interview Q&A

1. You've been asked to set up a highly available Kubernetes cluster for a production environment. How would you approach it?

Setting up a **Highly Available (HA) Kubernetes cluster** means building a system that ensures no single point of failure. This involves planning the cluster control plane, etcd database, networking, and worker nodes with redundancy, failover, and load balancing.

✅ **Key Components in HA Setup:**

1. **Control Plane Redundancy**
   - Minimum 3 control plane (master) nodes to ensure quorum in etcd
   - Spread across availability zones (AZs) in cloud environments
2. **etcd Cluster Setup**
   - Distributed key-value store
   - Minimum 3 odd-numbered nodes (5 recommended for larger clusters)
   - Secure communication with TLS
   - etcdctl and etcd metrics are used to monitor health
3. **Load Balancer in front of Control Planes**
   - External (e.g., AWS ELB or HAProxy)
   - Accepts requests to kube-apiserver and forwards to healthy masters
4. **Worker Nodes**
   - Minimum 2 or more
   - Join using kubeadm join or managed via autoscaling groups
   - Run workloads; need to be distributed across AZs
5. **Networking**
   - Use CNI plugins (Calico, Flannel, Cilium) for inter-pod communication
   - Configure pod CIDR ranges carefully
6. **Storage**
   - Dynamic storage provisioners (EBS, GCP PD, etc.)
   - PersistentVolumes backed by cloud-native or NFS storage

7. **Ingress & DNS**
    - Ingress controller (Nginx, Traefik)
    - CoreDNS deployed as a replica set
8. **HA Tools**
    - Use **kubeadm HA mode** or **Kubespray** for setup
    - Can also use **K3s** with embedded etcd for lightweight clusters

✅ **Example kubeadm HA Architecture:**

- 3 Master nodes
- 1 HAProxy Load balancer (or AWS NLB)
- 3 etcd nodes (can be co-located or separate)
- Multiple worker nodes
- TLS certificates and RBAC configured

Commands (using kubeadm):

```
# Initialize first master with HA flags
kubeadm init --control-plane-endpoint "LB_DNS:6443" \
--upload-certs --pod-network-cidr=192.168.0.0/16

# Join other masters
kubeadm join LB_DNS:6443 --token <token> \
--discovery-token-ca-cert-hash sha256:<hash> \
--control-plane --certificate-key <key>

# Join worker
kubeadm join LB_DNS:6443 --token <token> \
--discovery-token-ca-cert-hash sha256:<hash>
```

---

2. How do you synchronize or set the correct system time on a Linux server?

Incorrect system time can lead to SSL/TLS issues, misaligned logs, and broken cron jobs. It's critical for distributed systems like Kubernetes, CI/CD, or time-based secrets.

✅ **Tools to Use:**

- ntpd – Older method, daemon-based
- chronyd – Modern, faster synchronization
- timedatectl – Unified CLI to control time

Step-by-step with chrony:

Install chrony

sudo apt install chrony -y

Check NTP source configuration

cat /etc/chrony/chrony.conf

Restart the service

sudo systemctl restart chrony

Verify NTP is syncing

chronyc tracking

chronyc sources

✅ **Use timedatectl to set or sync:**

Check current time and NTP status

timedatectl

Enable automatic NTP

timedatectl set-ntp true

If a specific time server is needed (e.g., ntp1.example.com):

sudo nano /etc/systemd/timesyncd.conf

Add: NTP=ntp1.example.com

sudo systemctl restart systemd-timesyncd

---

3. What is the use of top and htop commands in Linux? When would you use each?

Both are used for real-time **system resource monitoring**, especially for CPU, memory, and process management.

top (built-in):

```
top
```

- Interactive CLI-based process viewer
- Displays processes by CPU usage
- Press k to kill, P to sort by CPU, M for memory

htop (advanced, colorful, more interactive):

```
sudo apt install htop
```

```
htop
```

- Better UI with color-coded graphs
- Navigate with arrow keys
- Tree view of process hierarchies
- Easily filter/search with /

✅ **When to use what?**

Scenario	Use
Minimal Linux servers (no htop)	top
Need interactive tree view & mouse	htop
Remote server with no extras	top
Debugging hung processes	htop

---

4. What is the difference between head and tail commands? Write the syntax for each.

Both are used for **reading a specific portion** of files from either the beginning (head) or end (tail).

✅ **head:**

Shows **first N lines**

```
head -n 10 filename.log   # First 10 lines
```

✅ **tail:**

Shows **last N lines**

```
tail -n 10 filename.log   # Last 10 lines
```

Bonus: Real-time log monitoring

```
tail -f /var/log/syslog   # Follow live logs
```

---

5. How can you interact with a Kubernetes cluster without using kubectl?

Even if kubectl is not installed, you can **interact with Kubernetes directly via its REST API**.

✅ **Option 1: Use curl with kubeconfig**

```
export K8S_API=https://<cluster-ip>:6443
curl --cacert /etc/kubernetes/pki/ca.crt \
 --cert /etc/kubernetes/pki/admin.crt \
 --key /etc/kubernetes/pki/admin.key \
 $K8S_API/api/v1/namespaces
```

✅ **Option 2: Use client libraries (Python)**

```
from kubernetes import client, config
config.load_kube_config()

v1 = client.CoreV1Api()
print(v1.list_pod_for_all_namespaces())
```

✅ **Option 3: Use Dashboard, Lens, or K9s**

- Kubernetes Dashboard: GUI-based
- Lens IDE: Cross-platform Kubernetes GUI
- K9s: Terminal UI for Kubernetes

---

6. What methods can be used to set up a Kubernetes cluster? Which one would you choose and why?

Method	Description	Use Case
kubeadm	Manual install; lets you build clusters from scratch	Full control, best for learning & custom setup
kOps	Production-ready clusters on AWS	Best for AWS users with HA needs
RKE	Rancher Kubernetes Engine for easy setup	Easy Docker-based provisioning
Minikube	Local, single-node cluster	Best for local testing
EKS/GKE/AKS	Managed by AWS/GCP/Azure	Enterprise-ready, less operational overhead

Why I'd choose managed Kubernetes (EKS/GKE/AKS):

- Automated upgrades
- Scalability
- Integrated logging, monitoring, and IAM
- Great for production workloads

7. Explain a complete CI/CD pipeline and its stages.

A CI/CD pipeline automates the software development lifecycle — from code commit to deployment. It ensures quality, consistency, and speed in delivery.

CI/CD Pipeline Stages (Breakdown)

1. Code Commit (Trigger Stage)

- Developers push code to Git repositories (GitHub, GitLab, Bitbucket).
- A webhook triggers the CI/CD pipeline.

git push origin feature/login

---

2. Build Stage

- Source code is compiled (Java, C#, etc.)
- Dependencies are downloaded.

- Output: executable artifact (e.g., .jar, .dll, .js, .pyc)

Example (Java with Maven):

```
mvn clean package
```

Output: target/app.jar

---

3. Test Stage

- Unit Tests: Validate small code blocks
- Integration Tests: Check service integrations
- Code Coverage tools: JaCoCo, Istanbul

```
npm test        # Node.js
pytest          # Python
mvn test        # Java
```

---

4. Security & Linting

- Static Analysis: SonarQube
- Secrets Detection: Gitleaks
- Vulnerability Scanning: Trivy, Snyk

```
trivy image myapp:latest
```

---

5. Packaging

- Build Docker image (for containerized apps)

```
docker build -t myorg/app:v1 .
```

---

6. Artifact Upload

- Push to a central registry
    - Docker Hub, ECR → container images
    - Nexus, Artifactory → .jar, .zip

```
docker push myorg/app:v1
```

---

7. Deployment Stage

- Kubernetes: kubectl apply -f
- Helm: helm upgrade
- Serverless: AWS Lambda deploy
- SSH/Ansible for bare-metal

---

8. Monitoring/Notification

- Post-deploy tests, health checks
- Slack/email alerts, Prometheus metrics

✅ **Tools Involved:**

Stage	Tools
VCS	GitHub, GitLab
CI Engine	Jenkins, GitLab CI, GitHub Actions
Build Tools	Maven, npm, pip
Test Frameworks	JUnit, Mocha, PyTest
Security	Trivy, SonarQube, Gitleaks
Docker Registry	Docker Hub, ECR
CD Tools	ArgoCD, Helm, kubectl
Alerts/Monitoring	Slack, Prometheus, Grafana

---

8. Write a CI/CD pipeline for a Node.js application and explain each stage.

Here's a sample CI/CD flow using **GitHub Actions** for a Node.js app:

```
name: Node.js CI/CD Pipeline

on:
  push:
    branches: [ "main" ]

jobs:
```

```
  build-test:
    runs-on: ubuntu-latest
    steps:
    - uses: actions/checkout@v2
    - name: Set up Node
      uses: actions/setup-node@v2
      with:
        node-version: '18'

    - name: Install dependencies
      run: npm install

    - name: Run tests
      run: npm test

    - name: Run linter
      run: npm run lint

  docker:
    needs: build-test
    runs-on: ubuntu-latest
    steps:
    - uses: actions/checkout@v2

    - name: Build Docker image
      run: docker build -t myorg/nodeapp:${{ github.sha }} .

    - name: Push to DockerHub
      run: |
        echo "${{ secrets.DOCKER_PASS }}" | docker login -u ${{ secrets.DOCKER_USER }} --
password-stdin
        docker push myorg/nodeapp:${{ github.sha }}

  deploy:
    needs: docker
    runs-on: ubuntu-latest
    steps:
    - name: Deploy to Kubernetes
      run: kubectl apply -f k8s/deployment.yaml
```

Each job (build-test, docker, deploy) runs in sequence.

9. How would you set up Node.js on a Linux system for a new project?

✅ **Steps:**

```
# Install prerequisites
sudo apt update
sudo apt install curl -y

# Install Node.js via NodeSource
curl -fsSL https://deb.nodesource.com/setup_18.x | sudo -E bash -
sudo apt install nodejs -y

# Verify installation
node -v
npm -v
```

✅ **Initialize a new project:**

```
mkdir myapp && cd myapp
npm init -y
```

✅ **Create an app:**

```
// index.js
const express = require('express');
const app = express();
app.get('/', (req, res) => res.send('Hello World'));
app.listen(3000, () => console.log('Running on 3000'));

npm install express
node index.js
```

---

10. What is the purpose of tail and head in log monitoring? Provide syntax examples.

✅ **head → First few lines of a file**

head -n 50 /var/log/syslog # Shows top 50 lines

✅ **tail → Last few lines (great for latest logs)**

tail -n 50 /var/log/syslog # Last 50 lines

Live log monitoring

tail -f /var/log/nginx/access.log

✅ **Combine with grep**

tail -f /var/log/syslog | grep "error"

Used to:

- Monitor live logs
- Check startup issues
- Trace crash logs or shutdowns

---

11. A production server is showing the wrong time. How would you sync with an NTP server?

Step-by-step with chronyd:

Install chrony

sudo apt install chrony

Edit config

sudo nano /etc/chrony/chrony.conf

Add preferred NTP servers

Restart & enable

sudo systemctl restart chrony

sudo systemctl enable chrony

Verify

```
chronyc tracking
```

```
timedatectl
```

You can also force sync:

```
sudo chronyc makestep
```

Or using ntpdate (one-shot):

```
sudo ntpdate time.google.com
```

---

12. You're troubleshooting a large log file and need to view the top and bottom. What is the use of head and tail?

Log files can be GBs in size. You don't want to open them in an editor like vim. Instead:

```
head -n 100 /var/log/app.log   # See earliest logs
```

```
tail -n 100 /var/log/app.log   # See latest logs
```

Use in combination:

```
cat /var/log/app.log | head -n 50
```

```
cat /var/log/app.log | tail -n 50
```

Live tailing:

```
tail -f /var/log/app.log
```

Use with grep, awk, or sed to filter important events.