

## **What are NAT Gateways?**

A NAT Gateway (Network Address Translation Gateway) allows private subnets in a VPC to access the internet (e.g., for updates), without allowing the internet to initiate connections to them.

## **Pre-requisites to upgrade a K8s cluster:**

- Take a backup (etcd, config, etc.).
- Ensure kubectl, kubeadm, and kubelet are compatible.
- Drain and cordon nodes.
- Update master node first.
- Upgrade worker nodes one by one.
- Test workloads after upgrade.

## **What is a Pod Disruption Budget (PDB) in K8s?**

A PDB ensures a minimum number of pods are always running during maintenance (like node upgrade) to avoid app downtime.

## **Shell Script for Factorial:**

```
#!/bin/bash

read -p "Enter a number: " num

fact=1

for ((i=2; i<=num; i++)); do

    fact=$((fact * i))

done

echo "Factorial of $num is $fact"
```

## **VPC Structure Setup in Project:**

- 1 VPC with CIDR block (e.g. 10.0.0.0/16)
- Public Subnet for ALB/Frontend
- Private Subnet for backend and DB
- NAT Gateway in public subnet
- Route tables to control traffic

## **CI/CD Pipeline Setup & Security Tools:**

- Git -> Jenkins/GitHub Actions -> Docker -> Kubernetes
- Security tools: SonarQube, Trivy, Snyk, OWASP ZAP

## **How do you manage them?**

- Code versioning (Git)
- Infrastructure as Code (Terraform)
- Secrets management (Ansible Vault, AWS Secrets Manager)
- Alerts via Prometheus + Alertmanager or Grafana

## **Rough Pipeline Script for Microservices:**

stages:

- build
- test
- dockerize
- deploy

build:

script: mvn clean install

test:

script: mvn test

dockerize:

script:

- docker build -t myapp .
- docker push myrepo/myapp

deploy:

script:

- kubectl apply -f k8s/deployment.yaml

## **What is Multi-stage Docker Build?**

It's a way to use multiple FROM statements in one Dockerfile to build and then copy only the needed artifacts, making the final image smaller and more secure.

### **What are Manifest Files?**

Kubernetes YAML files that define desired state of resources like deployments, services, pods.

### **What is Ansible Vault?**

It helps encrypt sensitive data like passwords or keys in playbooks or roles.

### **How to Make K8s Cluster Highly Available:**

- Multiple control plane nodes
- Load balancer in front
- etcd in HA setup
- Pod replicas across nodes

### **Monitoring Tools & Common Errors:**

- Prometheus, Grafana, ELK Stack, Jaeger
- Alerts: pod crashloop, memory limit exceeded, image pull errors

### **Terraform Script for VPC (Rough Example):**

```
resource "aws_vpc" "main" {  
    cidr_block = "10.0.0.0/16"  
}
```

```
resource "aws_subnet" "public" {  
    vpc_id      = aws_vpc.main.id  
    cidr_block = "10.0.1.0/24"  
    map_public_ip_on_launch = true  
}
```

```
resource "aws_internet_gateway" "gw" {  
    vpc_id = aws_vpc.main.id
```

}

### **How Many Objects Can an S3 Bucket Store?**

Unlimited number of objects. There's no object count limit per bucket.

### **What are IAM Roles and Policies?**

- Roles: Define who/what can perform actions (e.g., EC2, Lambda).
- Policies: Define what permissions are allowed (e.g., read/write to S3).

### **What are Artifacts?**

Files generated after build like JARs, Docker images, or compiled binaries, used for deployment.

### **What are SATS and DATS?**

- SATS: System Acceptance Test - check complete system behavior.
- DATS: Data Acceptance Test - validate correctness of data and flow.

### **How Do You Find Errors in Pipelines?**

- Check pipeline logs in Jenkins/GitHub Actions.
- Use kubectl logs or describe for K8s pod issues.
- Monitor build and test stages for failure points.

### **What are Ansible Roles?**

Roles help organize Ansible playbooks by separating code into tasks, vars, templates, etc., to keep things modular and reusable.