Deploying Apps on Kubernetes (kubectl, YAML)

Day 24 of Devops 90 Days Challenge

What is YAML?

- **YAML:** YAML Ain't Markup Language
- **Purpose:** Human-readable format for data serialization
- **In Kubernetes:** Used to define the desired state of resources declaratively

Why Kubernetes Uses YAML

- Declarative Format: Define what you want, not how to do it
- Human-Readable: Easier than JSON for complex configs
- Flexible: One format for all K8s resources
- GitOps Ready: Supports versioning and CI/CD workflows

YAML Syntax Essentials

Concept	Description
Indentation	2 spaces (no tabs)
Lists	Use - for each item
Key-Value Pair	Format: key: value
Comments	Use #

Example:

```
containers:
  - name: nginx
    image: nginx
#this is comment
```

Core Kubernetes Resources

Kind	Purpose
Pod	Basic deployable unit
Deployment	Manages replicas & rolling updates
ReplicaSet	Maintains pod replicas
Service	Exposes Pods to network
ConfigMap	Inject config into Pods
Secret	Inject sensitive data
Ingress	HTTP access to Services

Anatomy of Kubernetes YAML

1. **apiVersion:** Identifies API version (e.g., v1, apps/v1)
2. **kind:** Type of resource (Deployment, Pod, Service)
3. **metadata:** Name and labels for the object
4. **spec:** Desired state of the object
5. **template:** Pod template inside spec

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: nginx-deployment
  labels:
    app: nginx
spec:
  replicas: 2
  selector:
    matchLabels:
      app: nginx
```

```
template:
  metadata:
    labels:
      app: nginx
  spec:
    containers:
      - name: nginx
        image: nginx:latest
        ports:
          - containerPort: 80
```

Validating YAML Files

- kubectl apply --dry-run=client -f file.yaml
- kubectl explain <resource>

Installing Kubernetes (Minikube)

- **kubectl install:** CLI for interacting with cluster
- **Minikube:** Local single-node Kubernetes
- **Commands:**

  minikube start --driver=docker

  kubectl get nodes

  kubectl cluster-info

Kubernetes with kubeadm (Multi-node)

1. 1 Master, 1+ Workers
2. Install tools: kubelet, kubeadm, kubectl
3. Initialize master: kubeadm init
4. Join workers: kubeadm join

Recap

Concept	Meaning
Cluster	Group of nodes with control plane
Node	Physical/VM worker machine
Pod	Runs one or more containers
Deployment	Manages replicas & updates
YAML	Declarative config format
Minikube	Local dev Kubernetes
kubectl	CLI for K8s API

Thank You

Stay tuned for Day 25: Services, Ingress & Load Balancing