

Day 26: Kubernetes Volumes, ConfigMaps, and Secrets

90 Days DevOps Challenge

Kubernetes Volumes Overview

- Containers are ephemeral; data lost on restart.
- Volumes persist data across container restarts.
- Support sharing data between containers in a pod.

Volume Types

1. `emptyDir` – Scratch space for pod lifecycle.
2. `hostPath` – Mount host directory (use with caution).
3. `persistentVolumeClaim` – External durable storage.
4. `configMap/secret/downwardAPI` – Ephemeral data injection.

Persistent Volumes (PV) & Persistent Volume Claims (PVC)

- PV: Actual storage resource (disk, NFS, etc).
- PVC: User requests for storage (size, mode).
- Binding: PVC binds to suitable PV
- Storage Class: For dynamic provisioning
- Reclaim policies: Retain, Delete, Recycle

Ephemeral Volumes

- Temporary storage lifecycle tied to Pod

Includes:

- emptyDir
- configMap
- secret
- CSI ephemeral
- downwardAPI

ConfigMaps

- Purpose: Store non-confidential config data
- Structure: key-value pairs or files

Usage:

- Environment variables
- Volume mounts
- Direct API access
- Immutable option available

Secrets

- Store sensitive data: passwords, tokens, keys.
- Use base64 encoding; encrypt with etcd at rest.
- Delivery:
 - Environment variables
 - Volume mounts

Projected Volumes

- Combines multiple volume sources into one

Useful for:

- configMap + secret + downwardAPI + token
- Mounted as a unified directory in pod.