

GitOps Workflow using ArgoCD on Kubernetes

Abstract

This project demonstrates the implementation of GitOps using ArgoCD on a Kubernetes cluster. GitOps is a modern deployment approach where the desired application state is stored in a Git repository and automatically synchronized with a Kubernetes cluster using automation tools like ArgoCD. This enables continuous delivery (CD), enhanced visibility, and better control over application deployments.

Introduction

In traditional CI/CD pipelines, manual intervention is often required to deploy applications. GitOps simplifies this process by using Git as the single source of truth for application configurations. ArgoCD continuously monitors the Git repository and ensures that the Kubernetes cluster matches the declared manifests. Whenever a change is committed, ArgoCD automatically syncs the deployment without manual intervention.

Tools Used

Tool	Purpose
K3s / Minikube	Local Kubernetes cluster setup for deployments
ArgoCD	GitOps operator for continuous delivery
GitHub	Hosts the repository containing deployment manifests
Docker	Builds and pushes container images
Kubectl	CLI tool to manage Kubernetes resources

Steps Involved in Building the Project

1. Setup Kubernetes Cluster: Installed Minikube locally and started the cluster:

```
minikube start --memory=4096 --cpus=2
```

2. Deploy ArgoCD: Installed ArgoCD in the *argocd* namespace:

```
kubectl create namespace argocd
kubectl apply -n argocd -f https://raw.githubusercontent.com/argoproj/argo-cd/stable/manifests/install.yaml
```

3. Push Deployment Manifests to GitHub: Created a repository and pushed Kubernetes deployment YAML files.

4. Configure ArgoCD Application: Created an ArgoCD application pointing to the GitHub repo:

```
kubectl apply -f app-config.yaml
```

5. Update & Observe Sync: Modified image tags in the manifest, committed changes, and verified ArgoCD automatically synced the updates.

Conclusion

This project demonstrates a complete GitOps workflow using ArgoCD on Kubernetes. By leveraging Git as the single source of truth and ArgoCD for automatic synchronization, we achieved a seamless continuous delivery pipeline. This reduces manual interventions, improves reliability,

and ensures faster, more consistent deployments.

Resume Line: Implemented GitOps pipeline using ArgoCD and Kubernetes to achieve automated deployments and continuous delivery.