GitOps and Argo CD

Declarative Continuous Deployment for Kubernetes (Beginner-Friendly Guide)

What Is GitOps?

GitOps is an operational model where Git acts as the single source of truth for both infrastructure and application configuration. Any desired system state must be defined in Git and automatically synchronized with the live environment.

Why GitOps Exists

Traditional deployment methods involve manual steps and push-based pipelines, which can cause configuration drift and security risks. GitOps solves this by enforcing consistency, traceability, and automation.

Declarative vs Imperative Deployment

Imperative deployments describe how to perform actions, while declarative deployments define the desired final state. GitOps relies entirely on the declarative approach.

Core Principles of GitOps

The four core principles are: Git as the single source of truth, declarative configuration, continuous reconciliation, and a pull-based deployment model.

What Is Argo CD?

Argo CD is a GitOps continuous delivery tool for Kubernetes. It runs inside the cluster and ensures the actual state matches the desired state stored in Git.

How Argo CD Works

Argo CD continuously monitors Git repositories, compares them with the live cluster state, and automatically applies changes when differences are detected.

Push-Based vs Pull-Based Deployment

In push-based models, CI pipelines push changes to clusters. In pull-based GitOps, Argo CD pulls changes from Git, improving security and reliability.

Self-Healing and Rollbacks

Argo CD automatically corrects configuration drift and enables easy rollbacks using Git revert, ensuring system stability.

Security Benefits

GitOps reduces attack surfaces by removing the need for external cluster access and ensures all changes are auditable through Git history.

Why GitOps Matters

GitOps increases deployment speed, reduces errors, and improves collaboration by aligning development and operations around Git workflows.

Final Thoughts

GitOps is a powerful practice for managing Kubernetes applications at scale. With tools like Argo CD, teams can achieve secure, reliable, and automated deployments.