What is Argo CD?

Argo CD (Argo Continuous Delivery) is a **GitOps-based Continuous Delivery tool** designed specifically for **Kubernetes**. It automates the deployment of your application manifests (YAMLs) from a **Git repository to your Kubernetes cluster**.

💡 Core Idea: Git as the Source of Truth

In GitOps with Argo CD:

- You **define your app manifests (YAML files)** in a Git repo.
- Argo CD **monitors the repo for changes**.
- When changes happen, Argo CD **automatically applies them** to the Kubernetes cluster to match the desired state.

⚙️ How Argo CD Works with Kubernetes

Component	**Role**
Git repository	Holds your Kubernetes YAMLs, Helm charts, or Kustomize files
Argo CD server (inside K8s)	Continuously watches Git for changes
Kubernetes cluster	The actual environment where apps are deployed
Argo CD CLI / UI / API	Tools to interact, visualize app status, and trigger syncs

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🧱 Features of Argo CD

- ✅ GitOps deployment model (automated & declarative)
- 🔄 Auto-sync between Git and Kubernetes
- 🧪 Detects **drift** between cluster and Git state
- 💻 Clean web UI and CLI for managing apps
- 🔐 RBAC, SSO, audit logs
- 🧩 Supports Helm, Kustomize, and raw YAML

🧰 Use Cases with Kubernetes

Use Case	Why Argo CD Helps
Multi-environment deployments	Manage dev/stage/prod from different Git branches or folders
Safe rollouts & rollback	Easily revert to previous Git commit state
Drift detection	Detect manual changes in the cluster (and fix them)
GitLab/GitHub integration	Sync from CI pipelines or webhooks
Team-based access control	Role-based access to applications

📌 Example Flow:

1. ✅ You push deployment.yaml to GitLab
2. 🔄 Argo CD detects the commit
3. 🚀 Argo CD applies the YAML to Kubernetes
4. 🔍 Argo CD shows sync status (Healthy / OutOfSync)
5. 🔁 You roll back by reverting the Git commit

🔧 Tech Stack Example:

- GitLab (or GitHub) for storing manifests
- Argo CD running in Kubernetes (e.g., MicroK8s, Minikube, EKS)
- Apps deployed via YAML / Helm / Kustomize