
Note (Declarative/GitOps Requirement):

All deployments (nginx, WordPress, MySQL, ingress-nginx, etc.) **must be managed in a GitHub repository and continuously reconciled with the Kubernetes cluster using FluxCD**. Nothing should be applied imperatively; everything must be done declaratively via GitOps.

Task 1: Cluster Setup and Application Deployment

- Create a Kubernetes cluster with k3s on your local machine.
- Use FluxCD (GitOps tool) to bootstrap the Flux controller into the cluster, and configure it to sync the cluster state from a GitHub repository.
- Set up SOPS with age for secret encryption in FluxCD.
- Deploy a bare-metal load balancer solution (e.g., MetalLB or OpenELB).
- Deploy ingress-nginx using Helm (chart version 4.11.7) via FluxCD:
 - Configure Helm values to deploy the ingress-nginx controller as a LoadBalancer service.
- Deploy the following workloads via FluxCD
 - MySQL database. MySQL secrets (username & password) must be encrypted with SOPS & age, and stored in GitHub.
 - Deploy WordPress

Expected Result: After deployment, WordPress should be functional and installable at <http://app.local>. **Make sure that WordPress can successfully connect to the MySQL database so that the installation works correctly.**

Task 2: Custom Ingress-NGINX Lua Plugin

- Using the [custom ingress-nginx Lua plugin](#), configure ingress-nginx to redirect **all 404 (Not Found) responses** to **google.com**.
- This should apply to any incoming request where the ingress-nginx resource is not found.

Expected Result: Visiting <http://app.local/notfound>, should redirect to google.com

Task 3: Monitoring

- Deploy **Prometheus**, **Loki**, and **Grafana** along with **Promtail** (or Alloy) declaratively with FluxCD.
- Configure logs from Kubernetes pods (e.g., WordPress, ingress-nginx, etc.) to be sent to Loki via Promtail/Alloy.
- Set up a Grafana dashboard to visualize WordPress pod logs.
- Export the Grafana dashboard as a **JSON file**.

Expected Result: Grafana should be accessible at <http://app-monitor.local>

Final Deliverables

1. GitHub repository containing all FluxCD manifests, HelmReleases, Kustomizations, and encrypted secrets.
 2. Age key pair (public and private) used to encrypt MySQL secrets.
 3. Exported Grafana dashboard JSON.
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