

# Inception of Things

42 School Project — Full Architecture Overview

**P1 K3s Cluster**

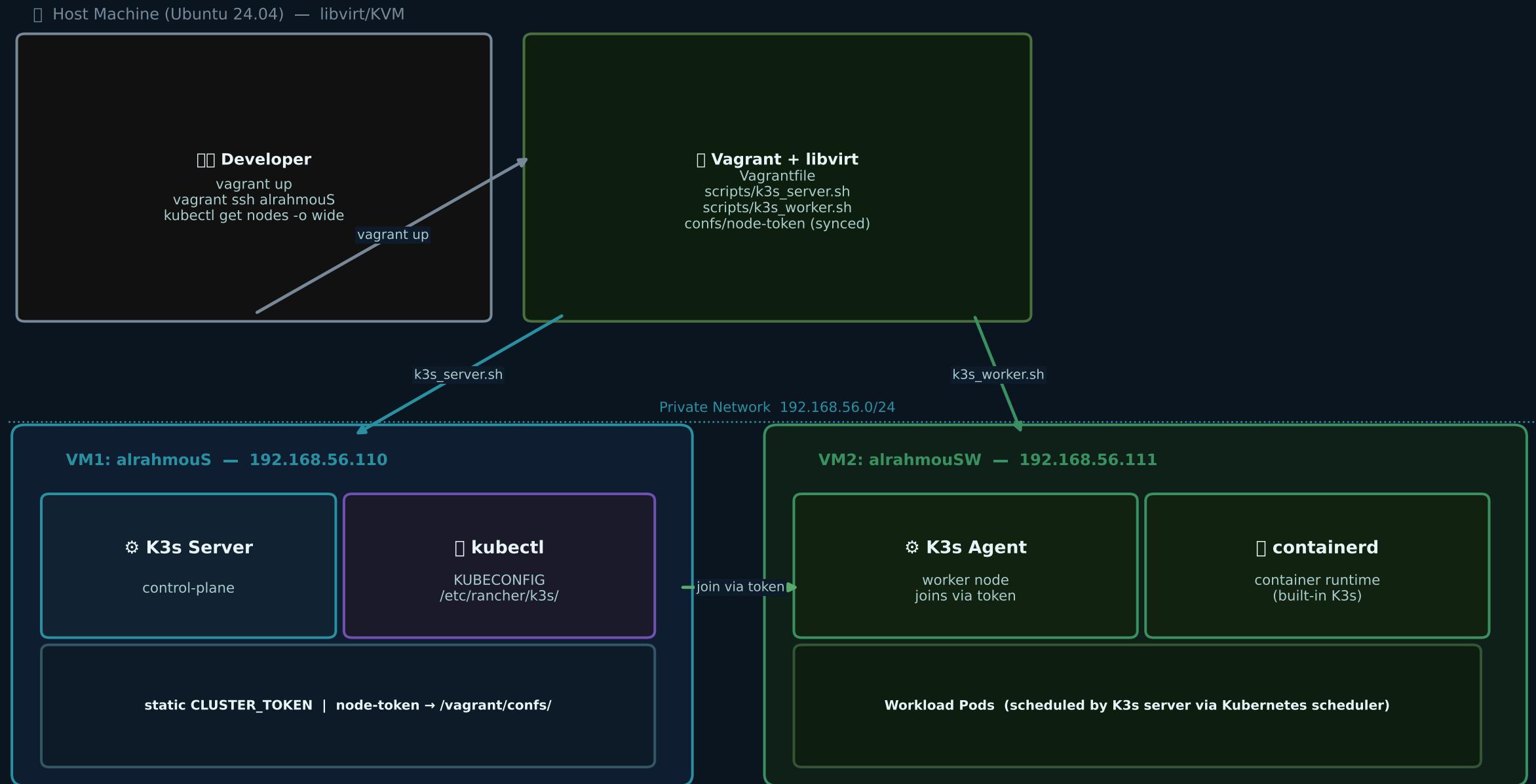
**P2 Ingress Apps**

**P3 GitOps / ArgoCD**

**Bonus GitLab + ArgoCD**

# Part 1 — K3s Cluster with Vagrant

2 VMs · libvirt/KVM · K3s server + worker



# Part 1 — Key Facts & Defense Commands

K3s · Vagrant · 2 VMs

## VMs

2 VMs: alrahmouS (server) + alrahmouSW (worker)

## IPs

192.168.56.110 (server) 192.168.56.111 (worker)

## K3s mode

Server: --cluster-init Agent: K3S\_URL + K3S\_TOKEN

## Token

Static CLUSTER\_TOKEN in Vagrantfile — written to /vagrant/confs/node-token

## Provisioning

Fully automated via shell provisioners (k3s\_server.sh / k3s\_worker.sh)

## Verify

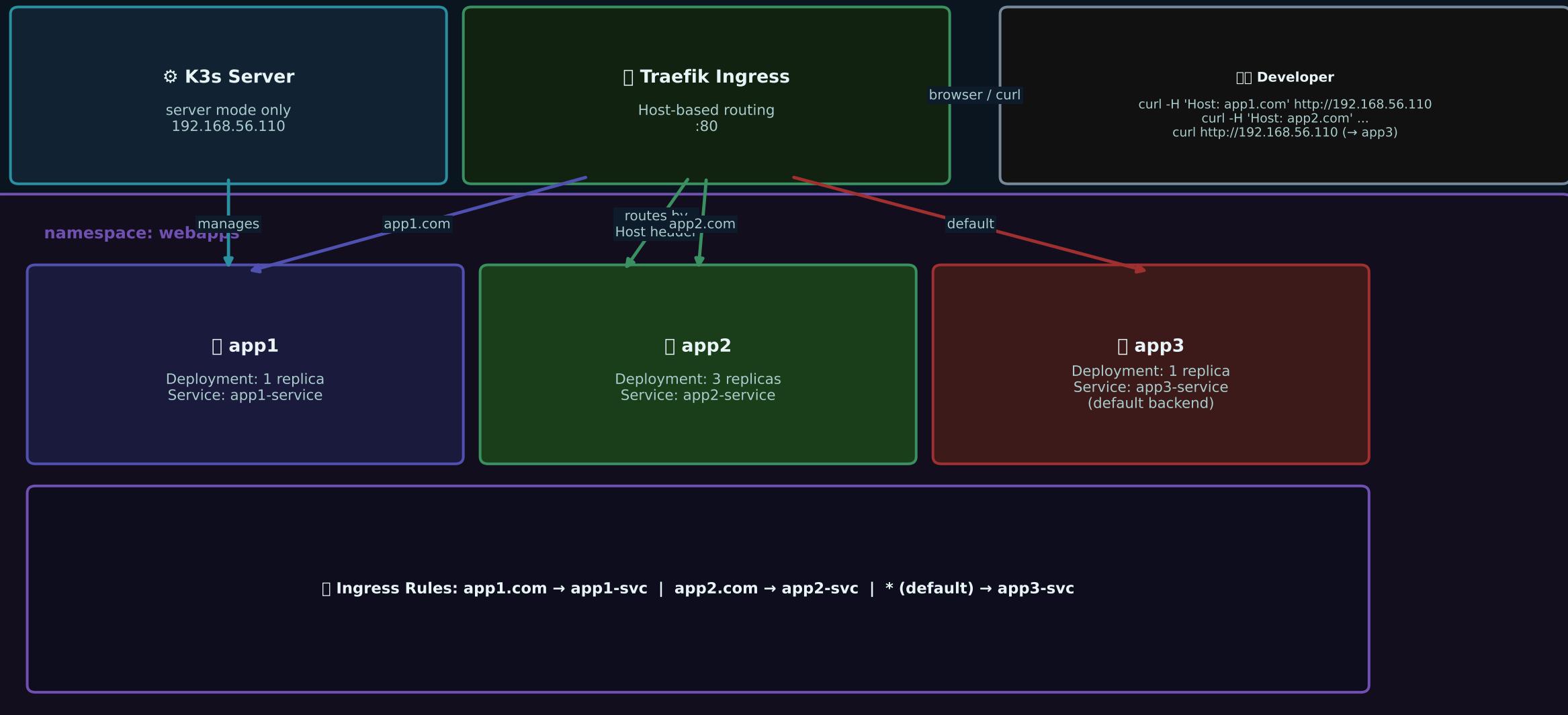
kubectl get nodes -o wide → 2 nodes, both Ready

vagrant up → vagrant ssh alrahmouS → kubectl get nodes -o wide

## Part 2 — K3s + Traefik Ingress + 3 Apps

1 VM · webapps namespace · Host-based routing

Host Machine — VM: alrahmouS 192.168.56.110



## Part 2 — Key Facts & Defense Commands

K3s · Traefik · Ingress · 3 Apps

### VM

Single VM alrahmouS at 192.168.56.110 (libvirt)

### K3s

Server mode only — no worker node needed

### Ingress

Traefik (built-in K3s) — Host-header based routing

### app1

1 replica — Host: app1.com → app1-service:80

### app2

3 replicas — Host: app2.com → app2-service:80

### app3

1 replica — default backend (any other Host)

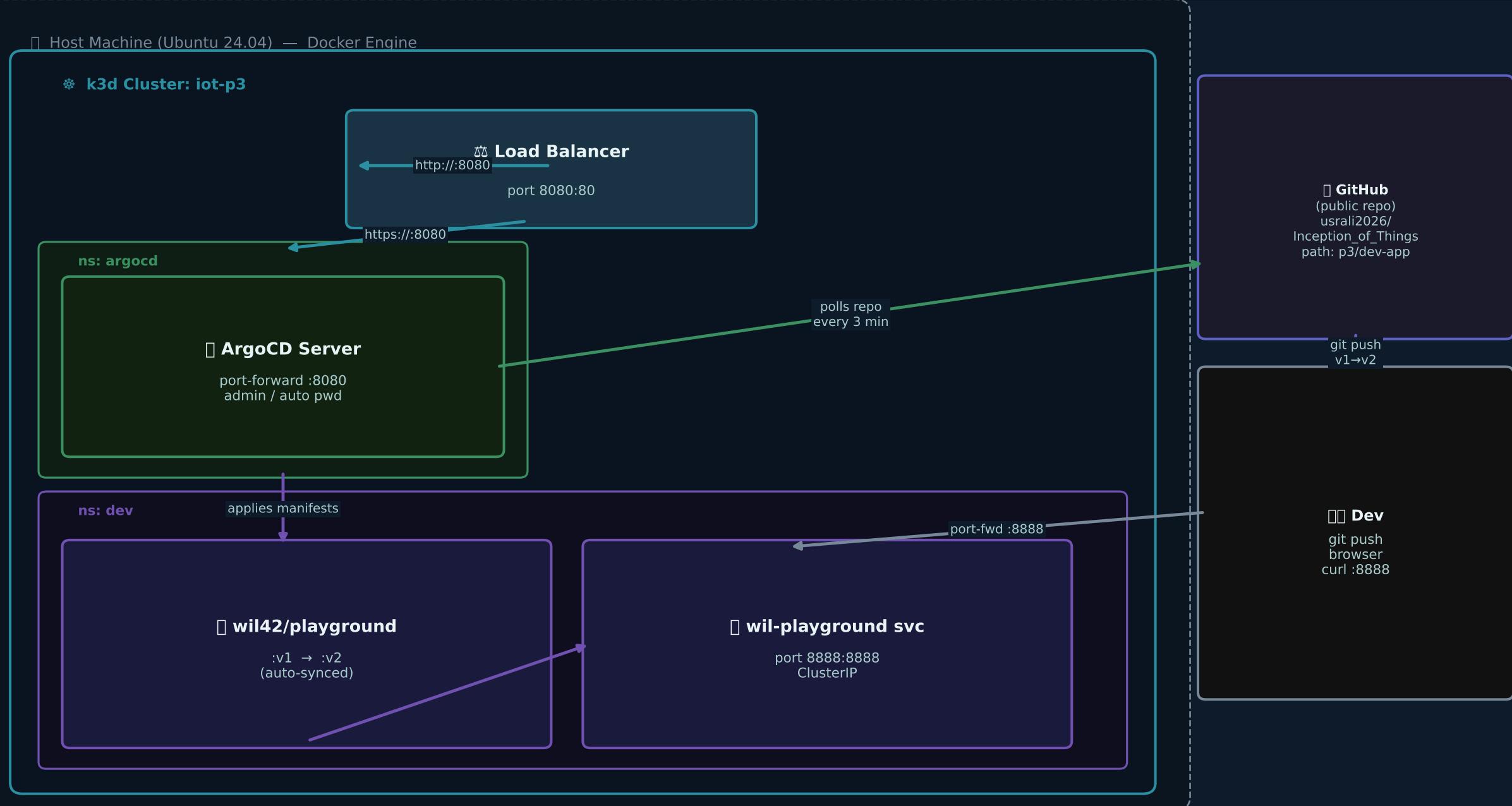
### /etc/hosts

192.168.56.110 app1.com 192.168.56.110 app2.com (on host)

```
curl -H 'Host: app1.com' http://192.168.56.110 → app1  
curl -H 'Host: app2.com' http://192.168.56.110 → app2  
curl http://192.168.56.110 → app3
```

## Part 3 — GitOps with ArgoCD + k3d

k3d · argocd ns · dev ns · GitHub



## Part 3 — Key Facts & Defense Commands

GitOps · ArgoCD · k3d · GitHub

### Cluster

k3d iot-p3 — 1 server + 2 agents (Docker containers)

### Namespaces

argocd (ArgoCD) + dev (app pods)

### App image

wil42/playground:v1 → change to :v2 in Git to prove GitOps

### Repo

Public GitHub: usrali2026/Inception\_of\_Things path: p3/dev-app

### ArgoCD sync

Auto-sync enabled — detects Git drift every ~3 min, reconciles

### Access

ArgoCD: port-forward svc/argocd-server 8080:443 App: port-fwd :8888

### GitOps flow

git push tag v1→v2 → ArgoCD detects drift → pod rolls over

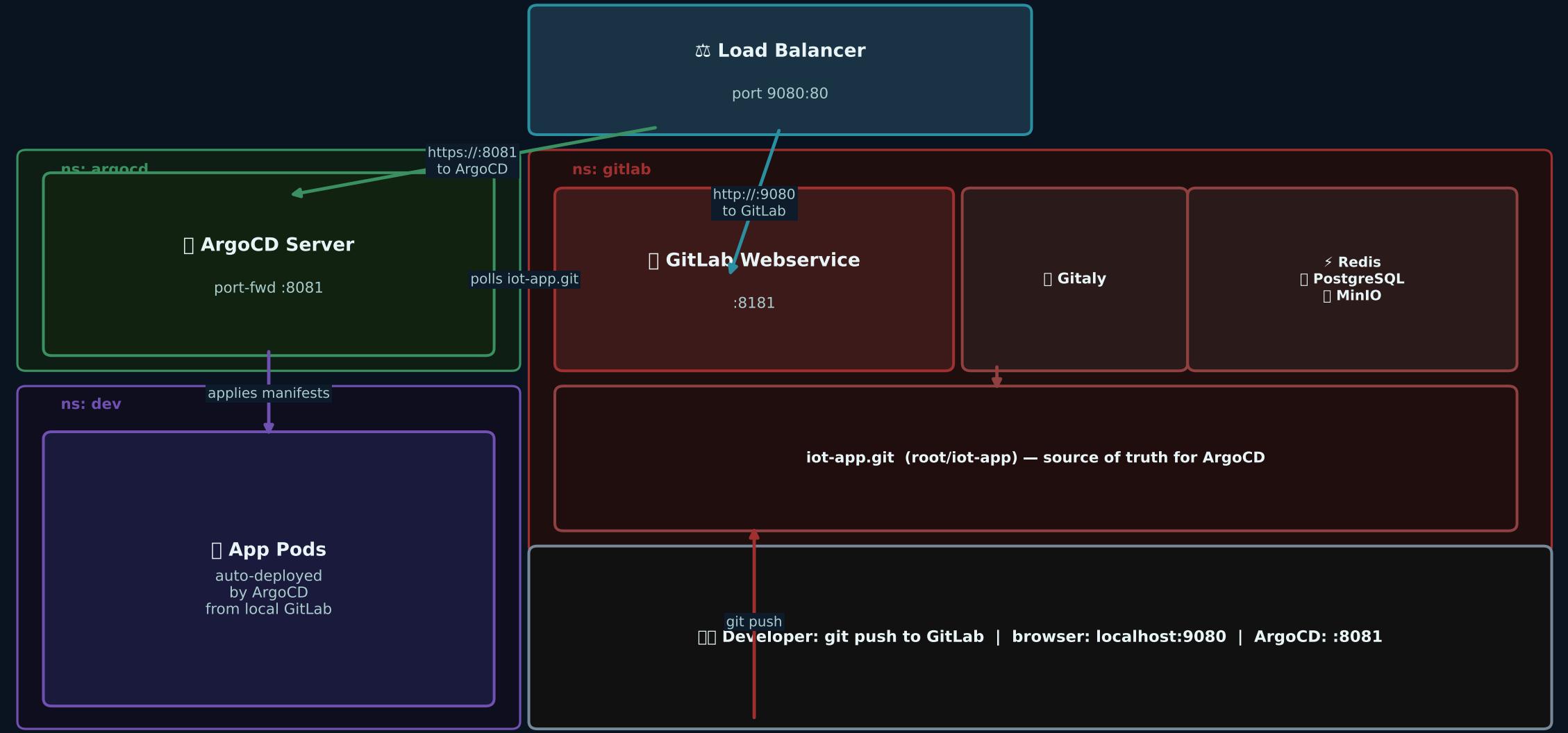
```
kubectl get pods -n argocd | kubectl get pods -n dev  
kubectl port-forward svc/argocd-server -n argocd 8080:443  
kubectl -n dev port-forward svc/wil-playground 8888:8888  
curl http://127.0.0.1:8888 → v1 (edit Git → v2) curl again → v2
```

# Bonus – Self-Hosted GitLab + ArgoCD

k3d · gitlab ns · argocd ns · dev ns · GitOps (no GitHub)

Host Machine — Docker on /goinfre | libvirt on /goinfre

\* k3d Cluster: iot-bonus



# Bonus – Key Facts & Defense Commands

GitLab local · ArgoCD · k3d · fully self-hosted

## Cluster

k3d iot-bonus — 1 server + 2 agents port 9080:80

## Namespaces

argocd + dev + gitlab (Webservice, Gitaly, PostgreSQL, Redis, MinIO)

## GitLab

Fully local — no GitHub needed | root / <initial-password>

## ArgoCD repo

<http://gitlab-webservice-default.gitlab.svc.cluster.local:8181/root/iot-app.git>

## GitOps flow

git push to local GitLab → ArgoCD polls → auto-deploys to dev ns

## Access GitLab

<http://localhost:9080> (k3d port 9080:80)

## Access ArgoCD

kubectl port-forward svc/argocd-server -n argocd 8081:443

## vs P3

P3 uses GitHub (external). Bonus replaces GitHub with self-hosted GitLab

```
bash bonus/scripts/setup.sh          # full deploy  
kubectl get secret gitlab-gitlab-initial-root-password -n gitlab -o jsonpath='{.data.password}' | base64 -d  
kubectl get pods -n gitlab | kubectl get pods -n argocd | kubectl get pods -n dev
```

# Full Comparison — P1 → P2 → P3 → Bonus

Side-by-side overview

	P1	P2	P3	Bonus
<b>VMs</b>	2 (server+worker)	1 (server only)	0 (Docker)	0 (Docker)
<b>K8s distro</b>	K3s bare	K3s bare	K3s in k3d	K3s in k3d
<b>Provisioner</b>	Vagrant/libvirt	Vagrant/libvirt	k3d CLI	k3d CLI
<b>Namespaces</b>	—	webapps	argocd+dev	argocd+dev +gitlab
<b>Apps</b>	None	app1/2/3	wil42/playground	custom app
<b>Ingress</b>	None	Traefik (Host)	LB :8080	LB :9080
<b>GitOps</b>	☐	☐	☐ GitHub	☐ GitLab local
<b>CI/CD</b>	☐	☐	ArgoCD	ArgoCD + GitLab