# Epics on K8s for a Control as a Service

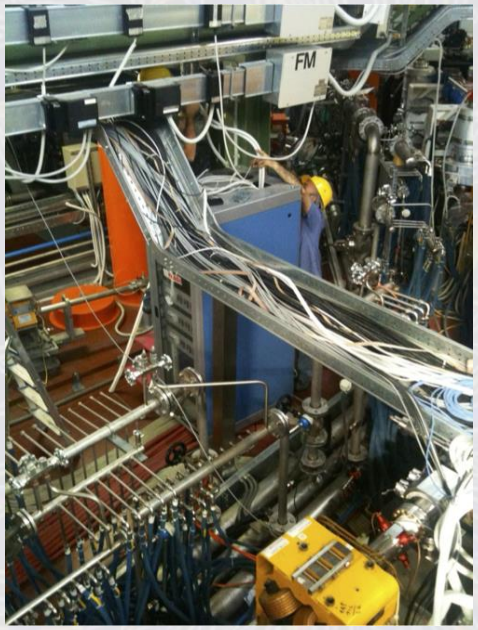
Riccardo Gargana

Workshop CCR 2024 - 20-24/05/2024

# Control systems for scientific installations

*Accelerators*
*Detectors (slow control)*
*Telescope arrays*
*Experimental setups*
*…*

**Software**
many applications
in a coherent
framework



**Plant =** many devices

**Features**
- Actuation
- Monitoring
- User friendly interface
- Data logging & retrieval
- Openness to external apps

EPICS

TANGO

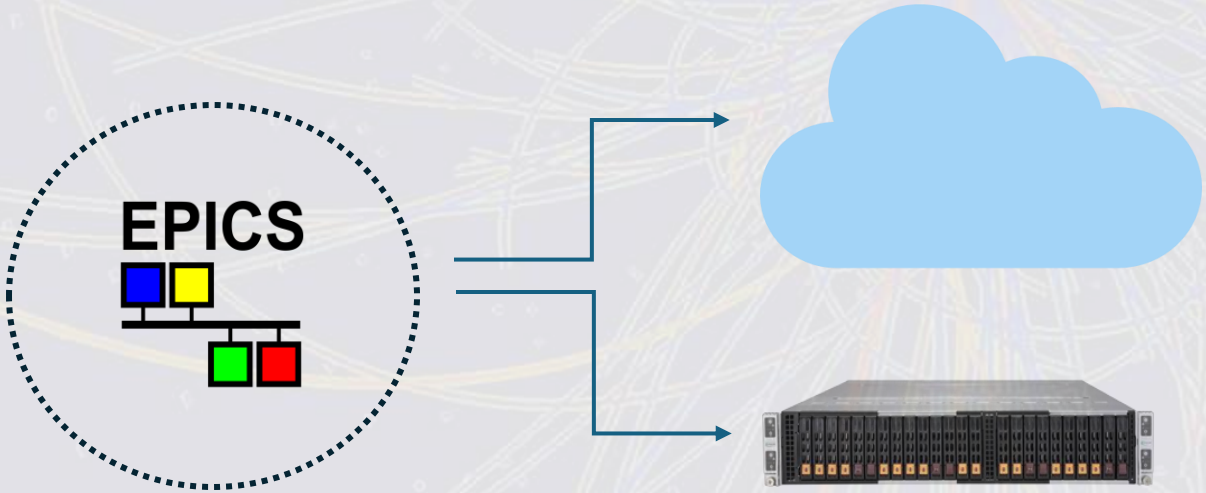
!CHAOS

**Many other custom solutions…**

EPIKS

# Why not to provide a CaaS (Control as a Service)?

- It fully meets the INFN mission;
- There is a large catchment area completely disregarded;
- We have already done a pilot project of it (!CHAOS INFN flagship project, funded by MIUR);
- !CHAOS is running on K8s (Really! Right now!) on some LNF facilities;
- We are using this approach for the SSRIP project in Romania (formerly ELI-NP).



# Provisioning K8s on Bare Metal

FOREMAN is a complete lifecycle management tool for physical and virtual servers.

PXE, DHPC and KICKSTAR file

4 X Server con Rocky Linux 9

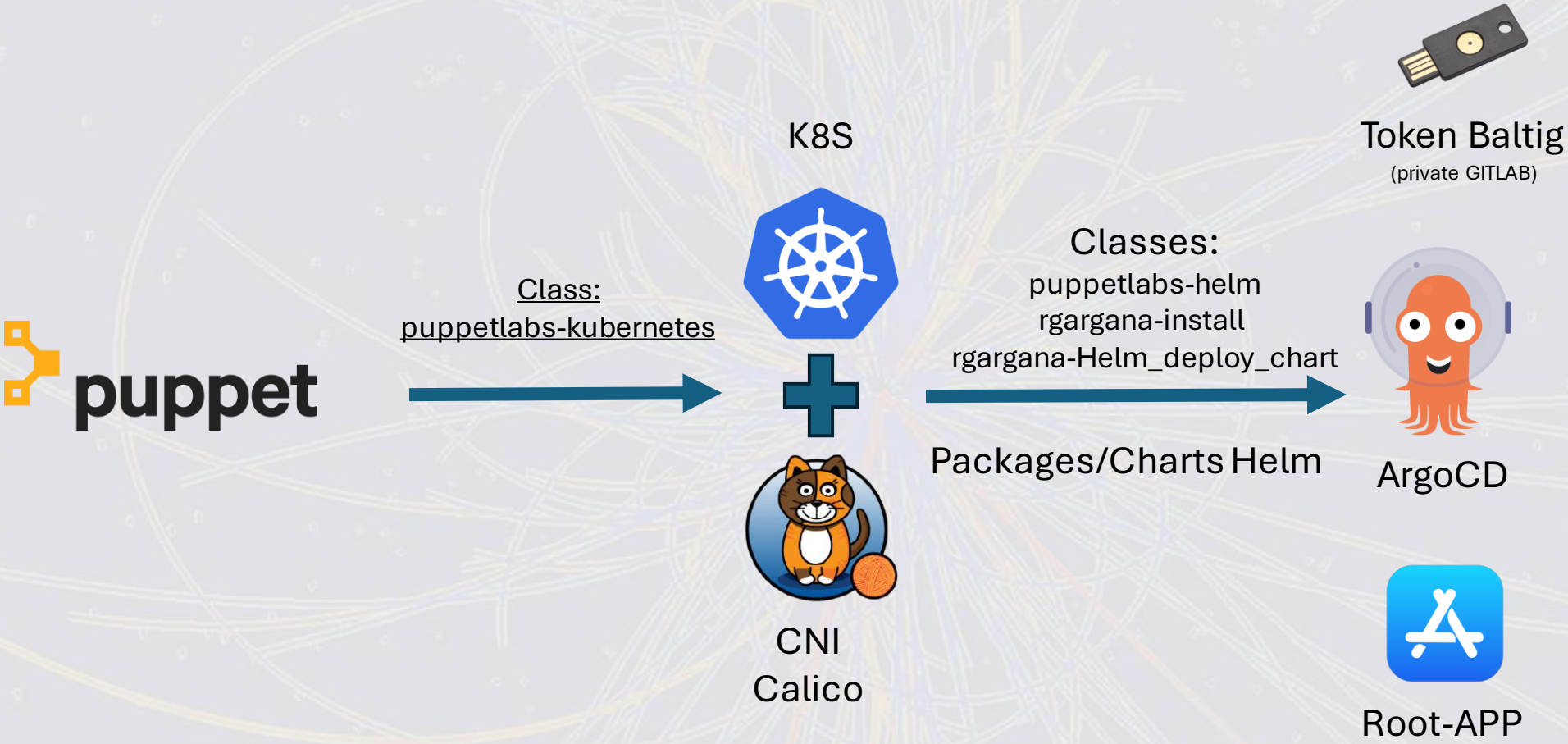
# K8s Cluster configuration

**puppet** is a software configuration management tool which includes its own declarative language to describe system configuration.

**Module using from puppet-forge:**
puppetlabs-kubernetes version 8.0.0
puppetlabs-helm version 4.0.0 (Patched in baltig)

**Module create purpose:**
rgargana-helm_deploy_chart (in baltig)
rgargana-installer (in baltig)

# Workflow deploy Infrastructure



# ArgoCD

Token Baltig
(private GITLAB)

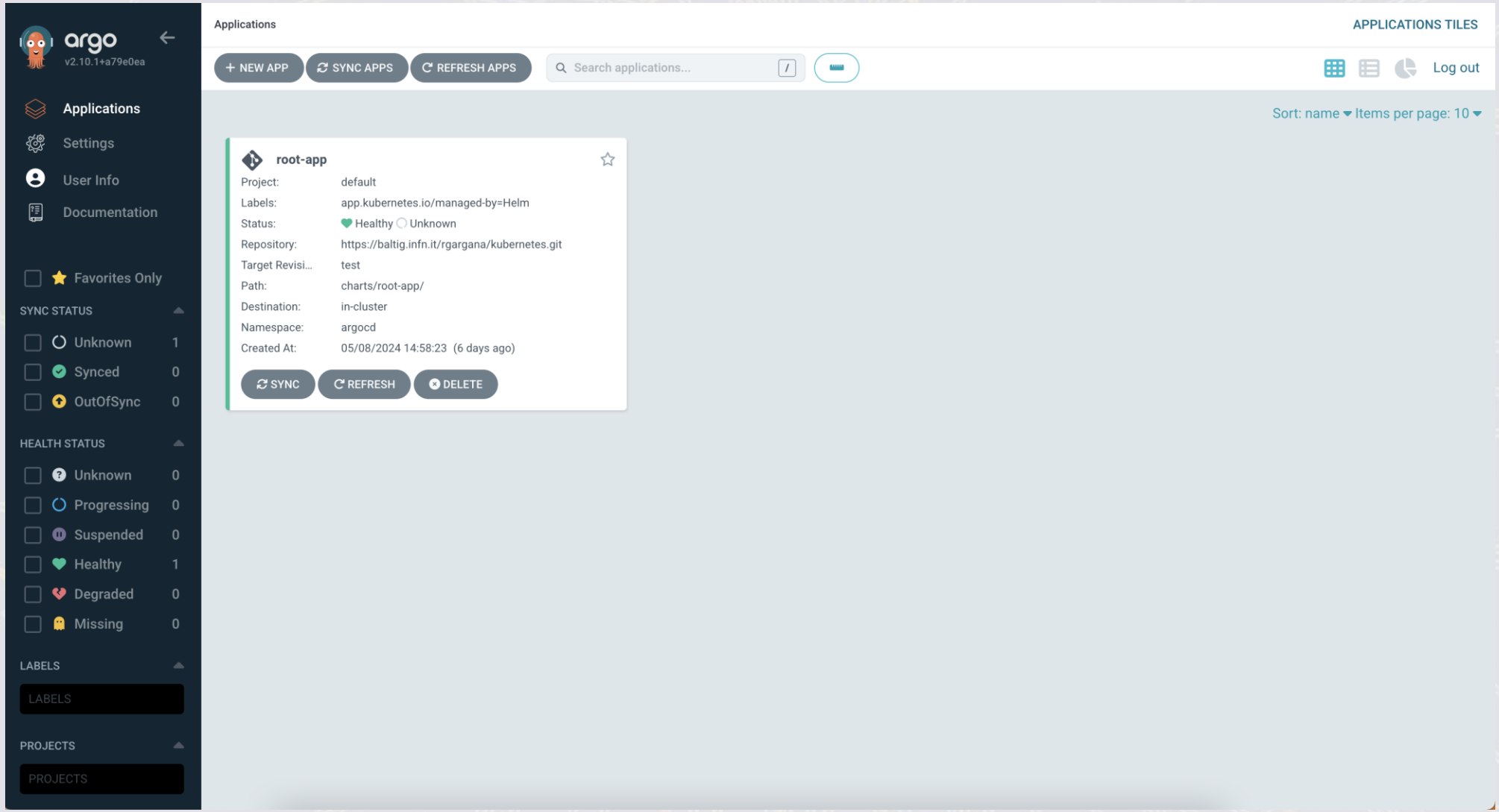
Baltig Token access

Argo CD is a declarative, GitOps continuous delivery tool for Kubernetes.

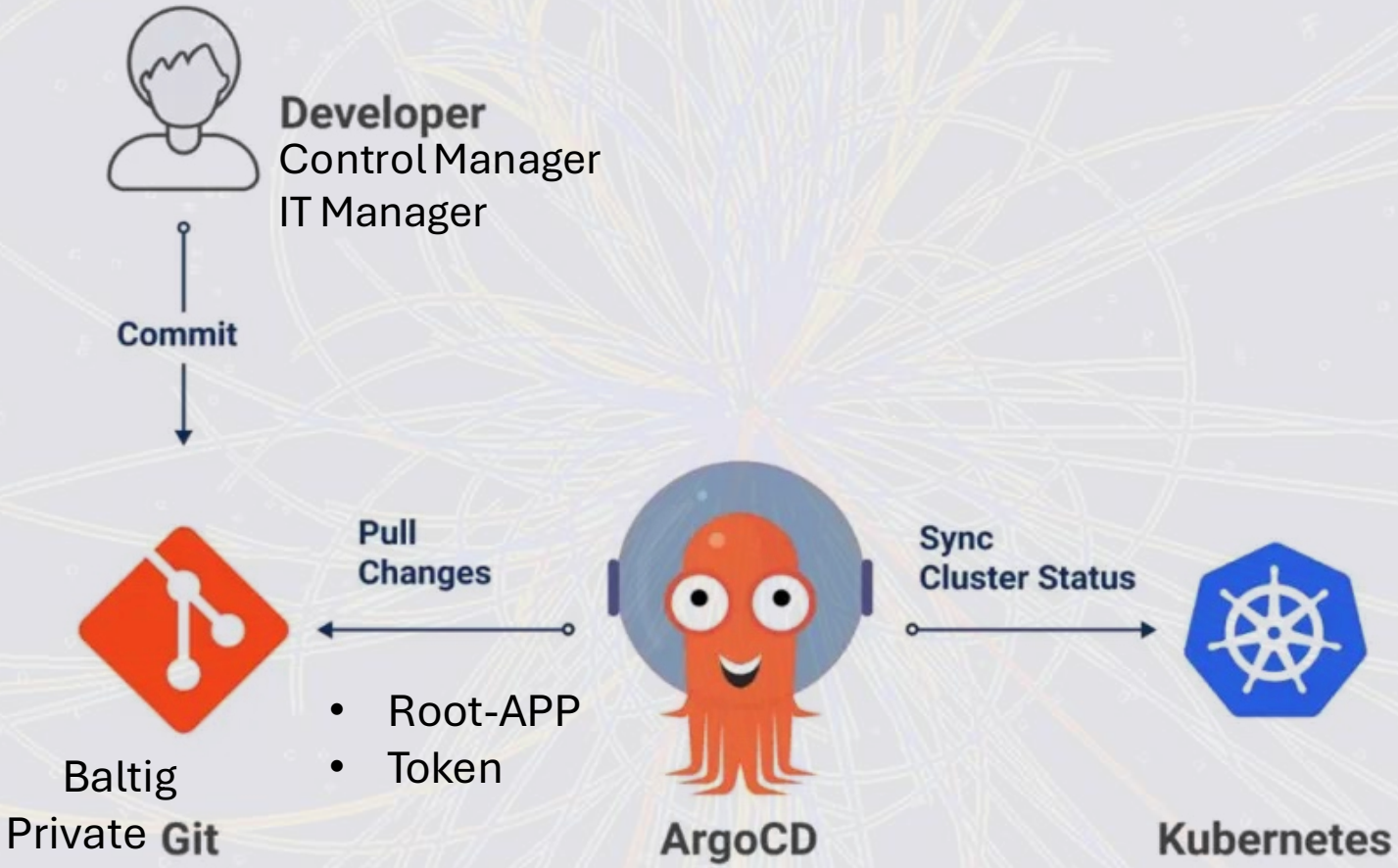
Root-APP

Root-APP is ArgoCD application, is used to automatically deploy other services included in the owner's Git/Baltig repository.

# ArgoCD Dashboard after deploy



# ArgoCD App-of-App - GitOps Approach



# Root-APP deploy

Riccardo Gargana / kubernetes / **Repository**

main | kubernetes / charts / root-app / templates / | History | Find file | Edit | Code

**Fix new Typo**
root authored 46 minutes ago

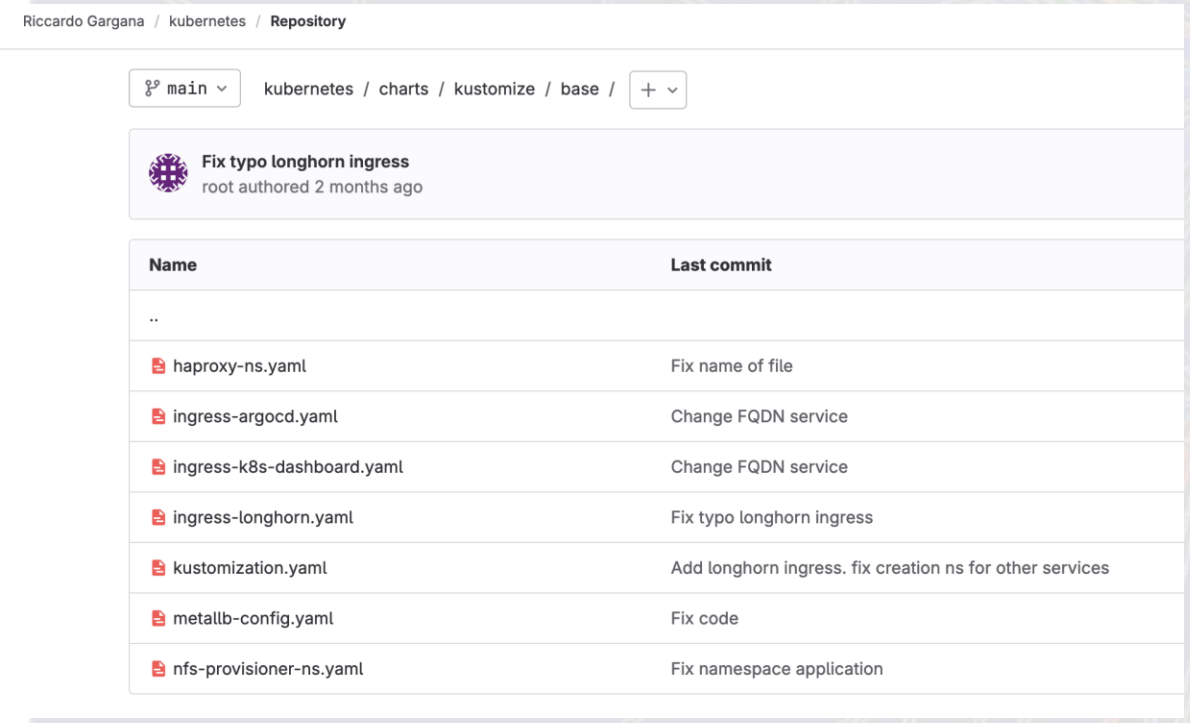
a28c9d6a

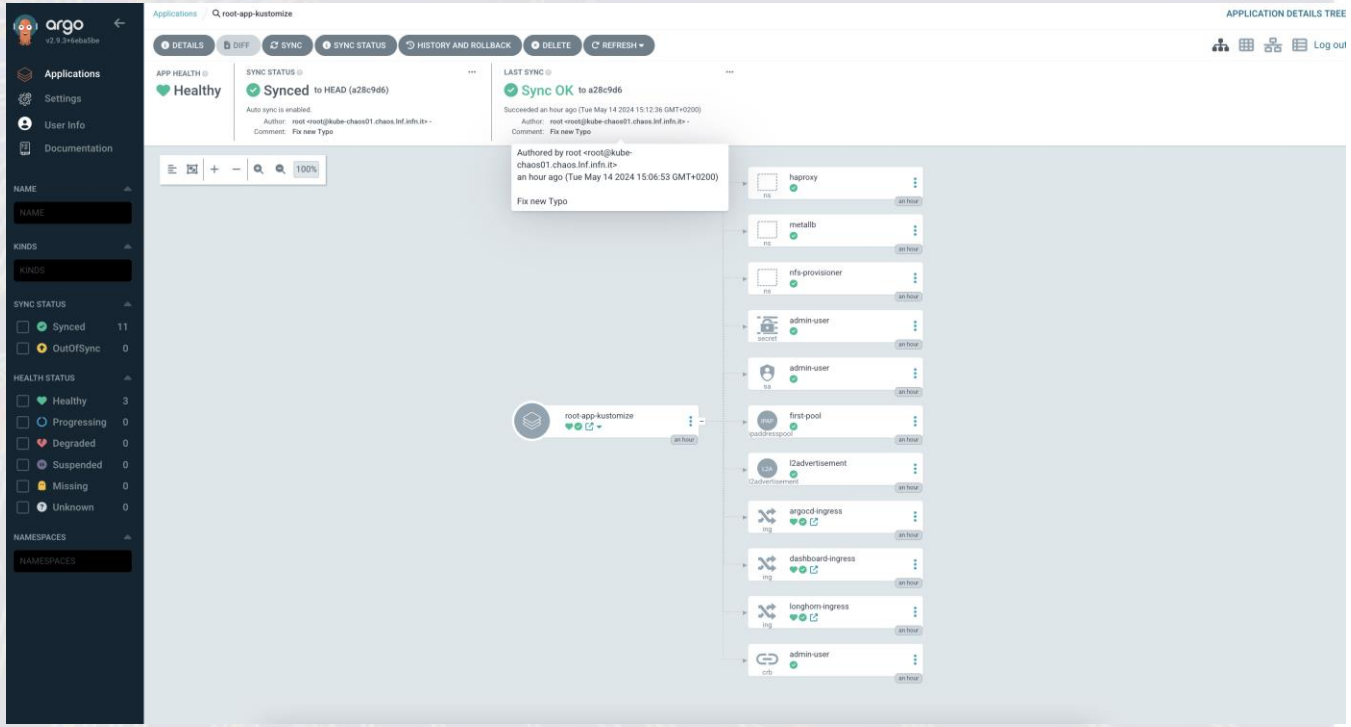
| Name | Last commit | Last update |
|---|---|---|
| .. | | |
| NFS-subdir-external-provisioner.yaml | Remove default storage class to nfs | 2 months ago |
| argo-cd.yaml | Fix dex on argocd files | 1 month ago |
| epik8-backend.yaml | fix Typo | 2 hours ago |
| haproxy-ingress.yaml | Add longhorn ingress. fix creation ns for other services | 2 months ago |
| longhorn.yaml | Change longhorn app | 2 months ago |
| metallb.yaml | Add longhorn ingress. fix creation ns for other services | 2 months ago |
| root-app-kustomize.yaml | Fix new Typo | 46 minutes ago |
| root-app.yaml | Fix namespace application | 2 months ago |
| sparc-console.yaml | Change privileg to null | 2 months ago |

# Kustomize into ArgoCD

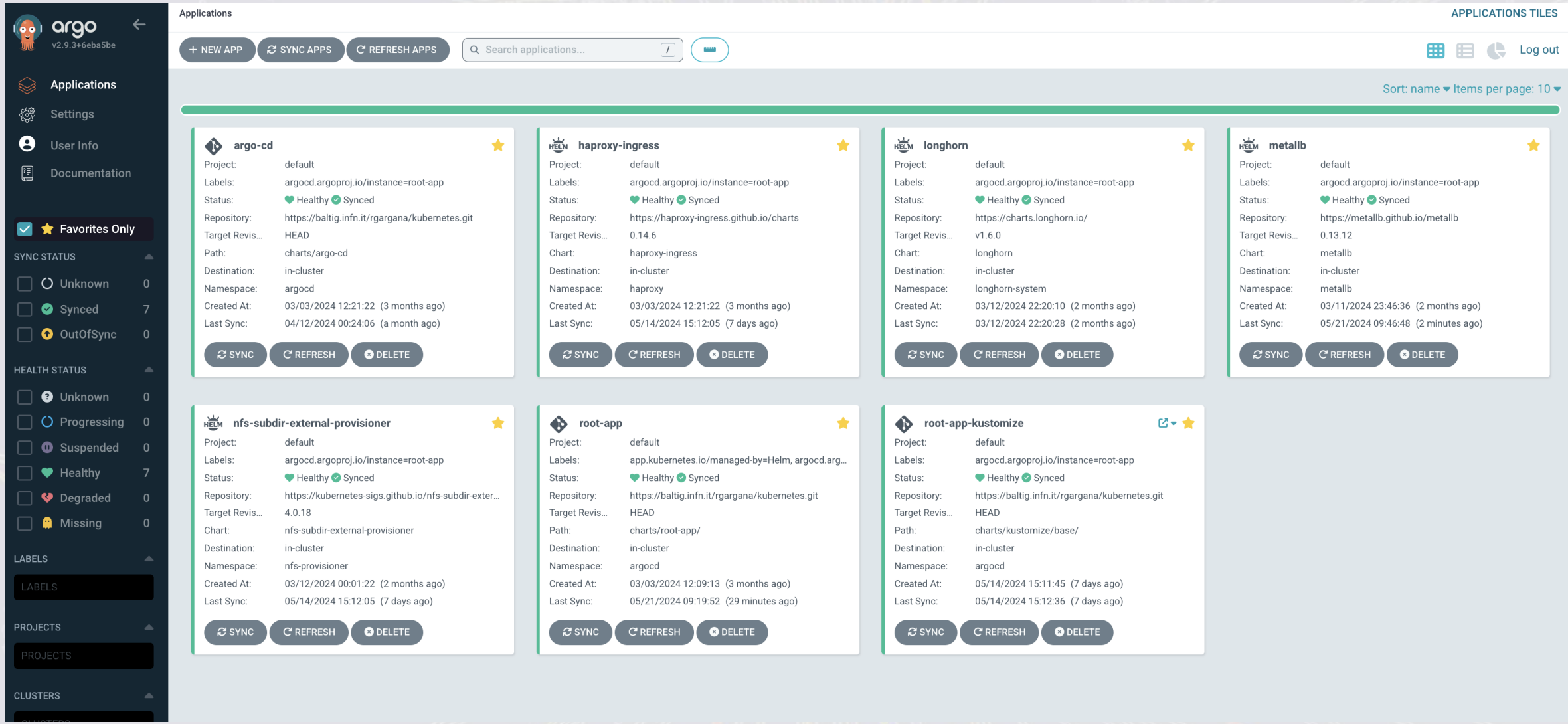
**Kubernetes native configuration management**

Kustomize introduces a template-free way to customize application configuration that simplifies the use of off-the-shelf applications.



# Overview Dashboard ArgoCD



# Provisioning OKD on vSphere

by Ramon Orrù

**Terraform (Infrastructure as code)** creates bastion host & service account privileges

**Ansible** sets up bastion host and compiles install config

**OKD** installer brings up whole cluster

**Installation takes approx. 45 mins**

# OKD Cluster configuration

**Kustomize** allows maintaining a cluster configuration efficiently

**vSphere** storage drivers support PVs dynamic allocation out of the box, even with CSI compliance

**ArgoCD** enables gitops features and keeps apps in sync

# Why OKD?

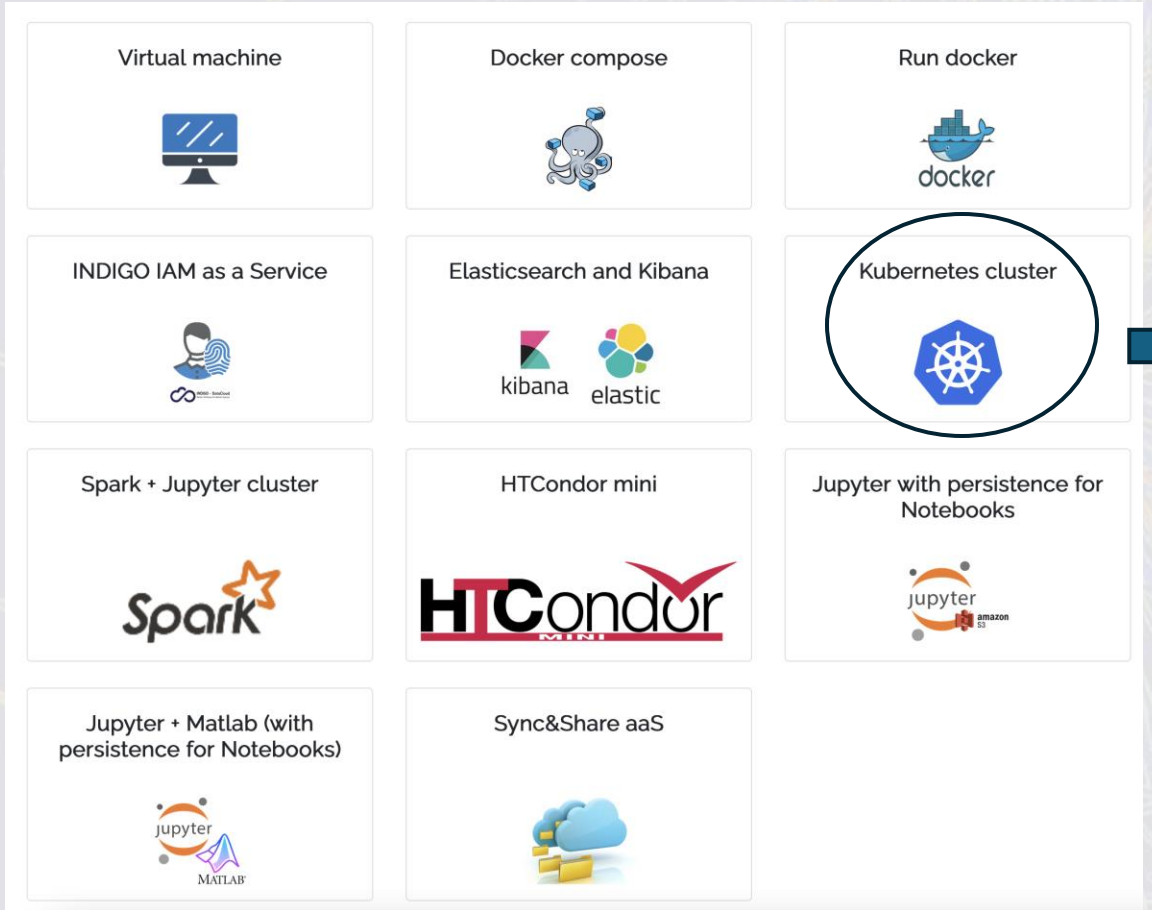
+

- IPI/UPI automated installer
- OTA updates
- CNI drivers
- CSI drivers
- Complete dashboard
- Ingress
- Monitoring platform
- Log ingestion
- Alerting
- Registry
- Auth connectors
- Operators marketplace
- KubeVirt (VMs)

= okd

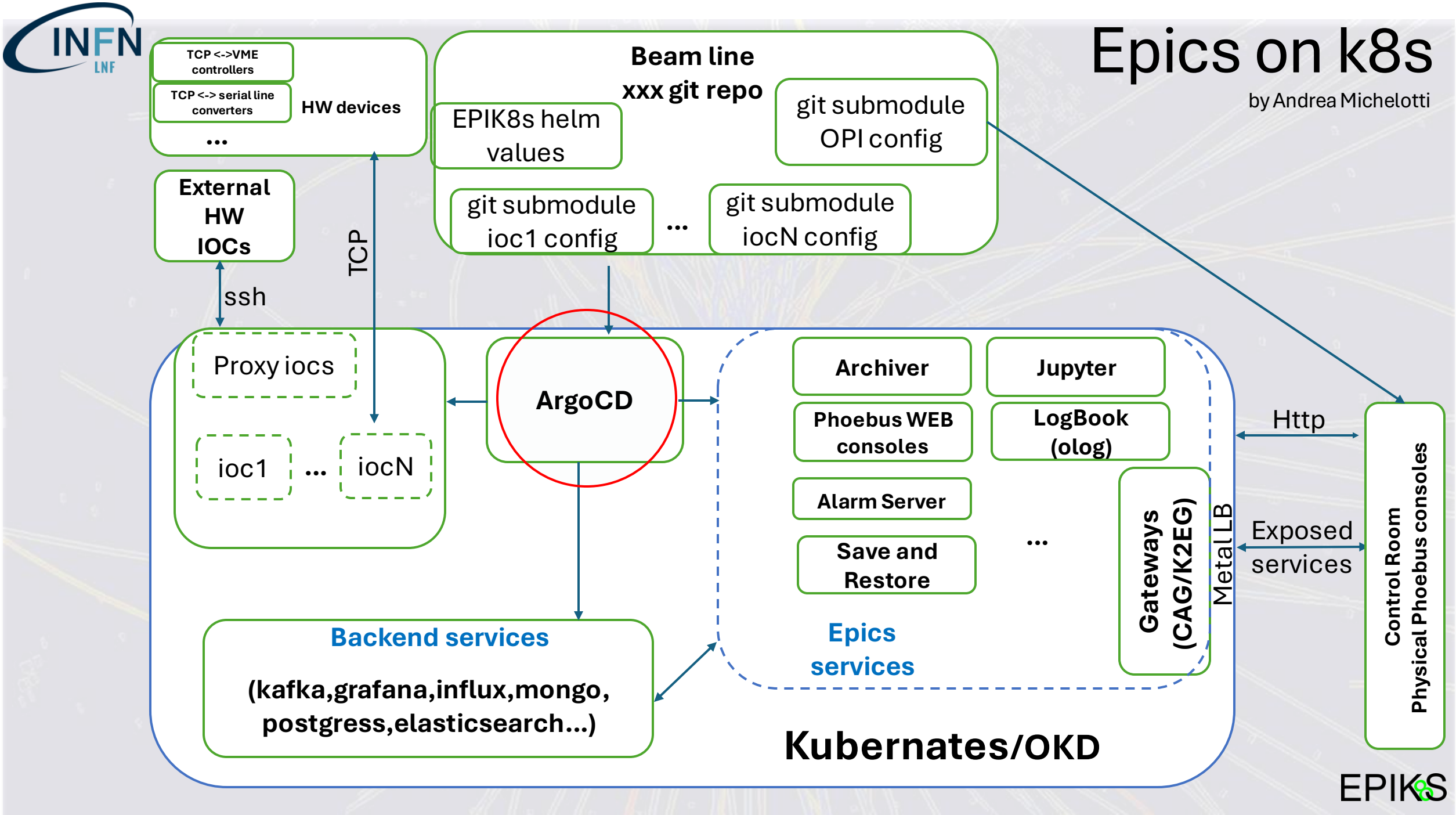
**Out of the box**

# K8s in INFN Cloud + ArgoCD

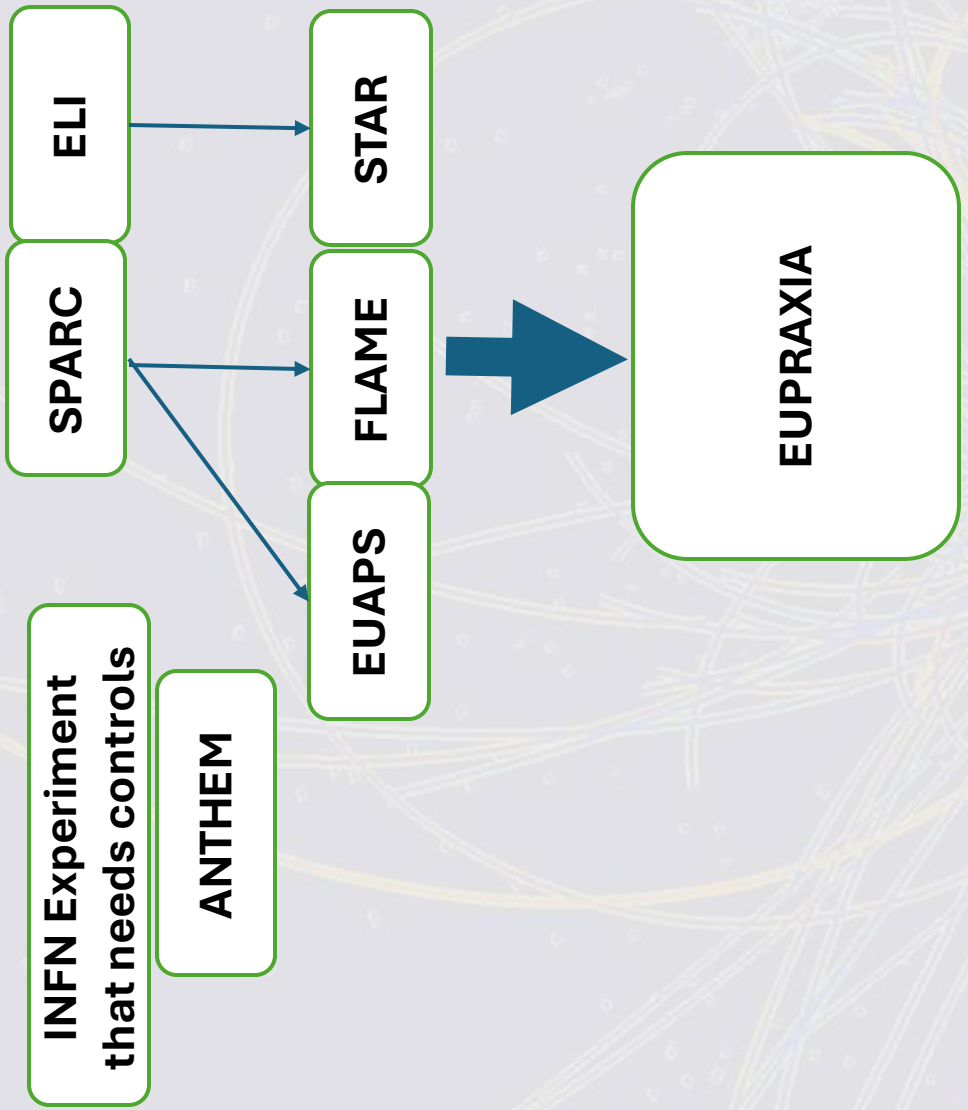


# Epics on k8s

by Andrea Michelotti



# EPIK8s a common platform for INFN experiments that needs EPICS controls

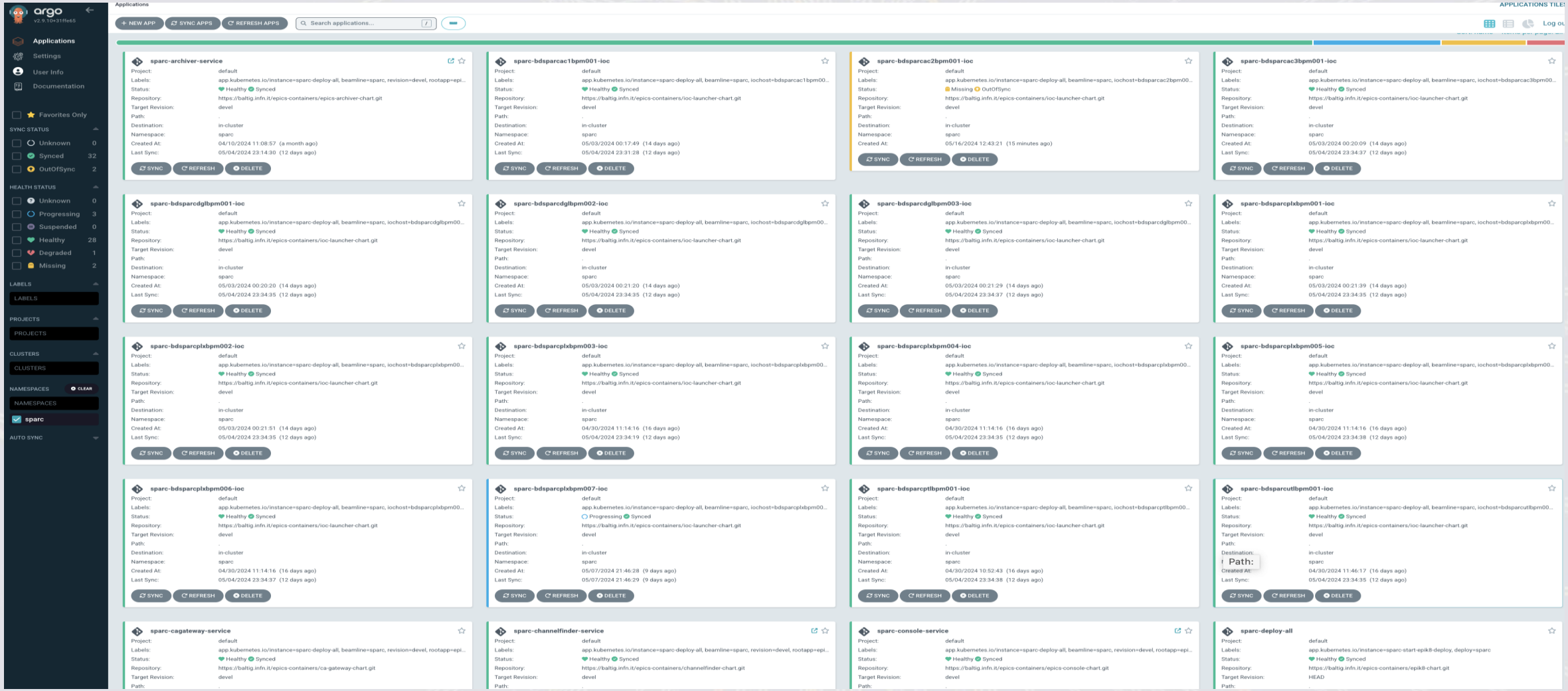



With standardized workflows and tools provided by a predefined platform, a database of controls, interfaces, and common procedures will be established. This platform will gradually become more comprehensive and refined, simplifying the installation of full-featured EPICS controls in our experiments.

**THIS IS THE MISSION OF "RETE EPICS INFN"**

**epics@lists.infn.it**

# ArgoCD control application lifecycle dashboard (LNF SPARC facility)



# Collaborative environment

IT Architect

Control System Manager

# Acknowledgement

Alessandro Stecchi

Andrea Michelotti

Claudio Bisegni

Ramon Orrù

Maurizio Montis

Mauro Giacchini

Francesco Piero Lorenzo Prelz

.... apologies for my memory