KubeCon CloudNativeCon Europe 2022

Intro to Kubernetes, GitOps, and Observability

Joaquin Rodriguez, Microsoft
Tiffany Wang, Weaveworks

A little bit about us:

Joaquin Rodriguez
Senior Software Engineer
Commercial Software Engineering
Microsoft

Tiffany Wang
Solutions Architect
Customer Success
Weaveworks

Register for the Hands On Tutorial

If you would like to participate in today's hands on tutorial, please register at: https://kube101.dev

Please use the provided User and Password, and register with your GitHub username.

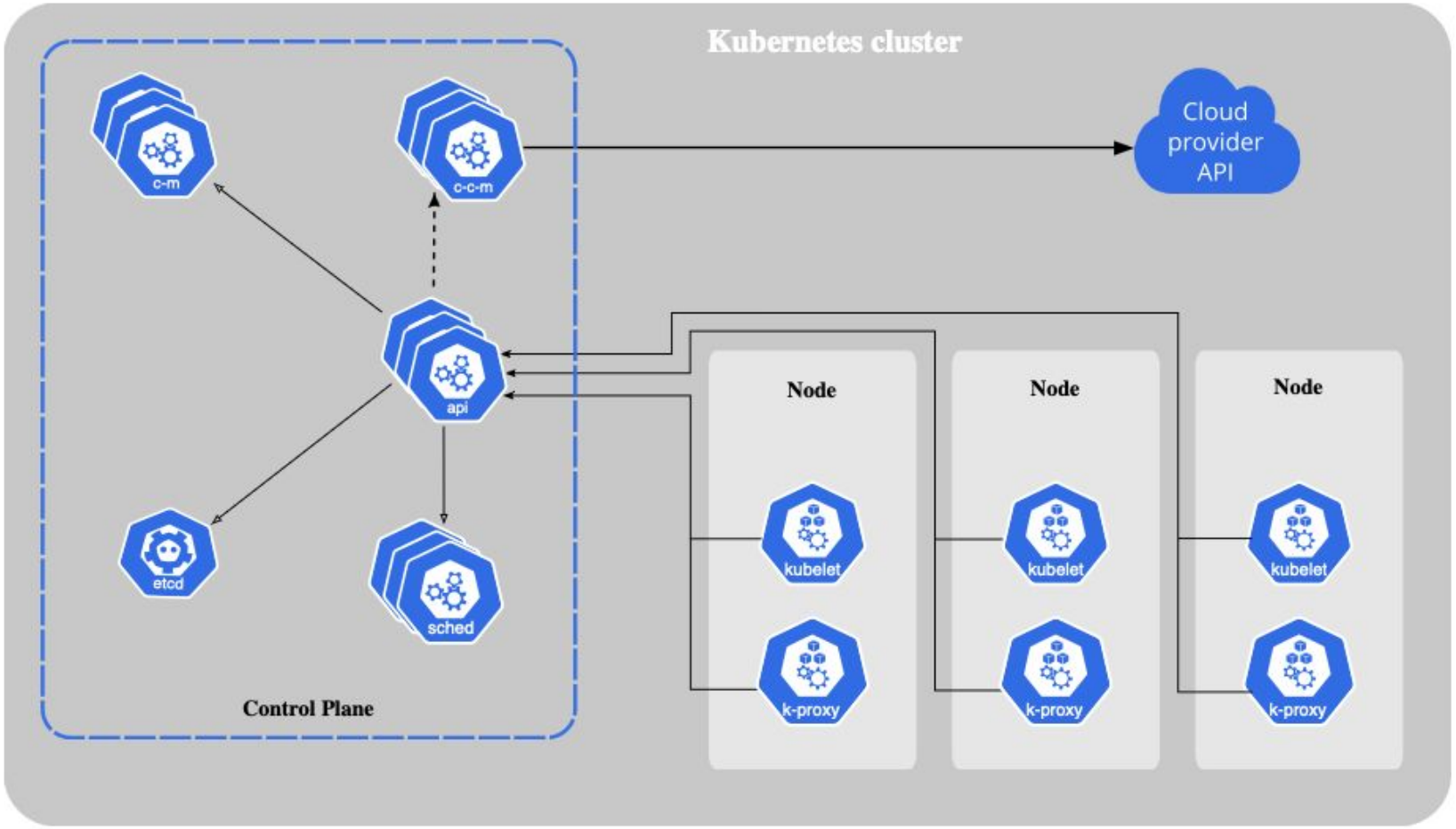
Following registration, you should have access to the https://github.com/kubernetes101/kubecon2022 repository

Intro to Kubernetes

Intro to Kubernetes

- OSS CNCF graduated project for container orchestration
- Declarative configuration to manage containerized workloads and services
- Cloud Native, provides:
  - Automation and observability
  - Self-healing and horizontal scaling
  - Service discovery and load balancing
- Scalable, runs on-premises, in public cloud, and hybrid environments

Kubernetes Cluster Overview



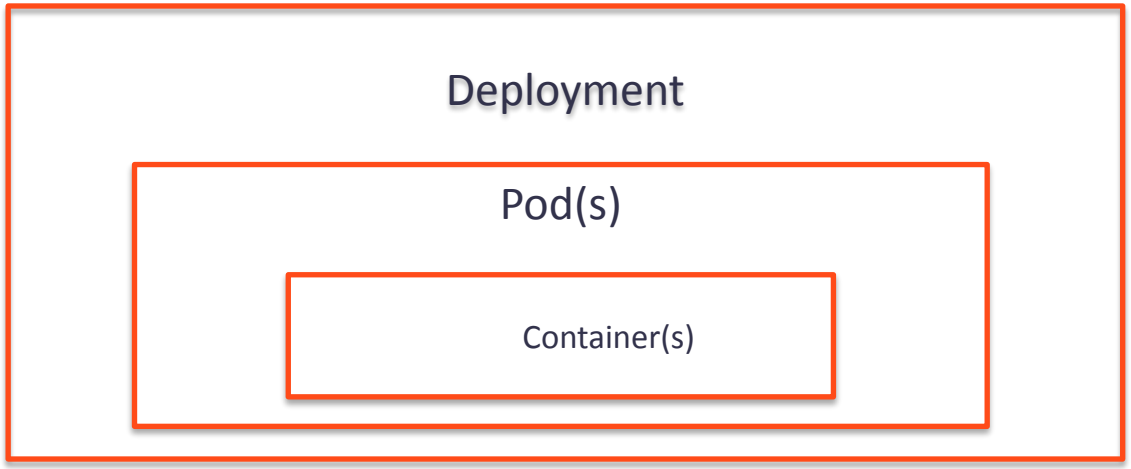
The components of a Kubernetes cluster

https://kubernetes.io/docs/concepts/overview/components

Kubernetes Resources Review

- Kubernetes REST API and declarative resources manage operations and communications between components
- Kubernetes API Groups (resources grouped based on their primary functions)
  - RBAC, scheduling, admission registration, autoscaling, events, apps, core
  - And many more!
- Core API group objects (core/v1 + apps/v1 API Groups)
  - E.g. Namespaces, Deployments, Services, Secrets
  - CRUD operations
- API extensions via Custom Resource Definitions + Controllers
- Declarative (YAML)

Kubernetes Resources At A Glance



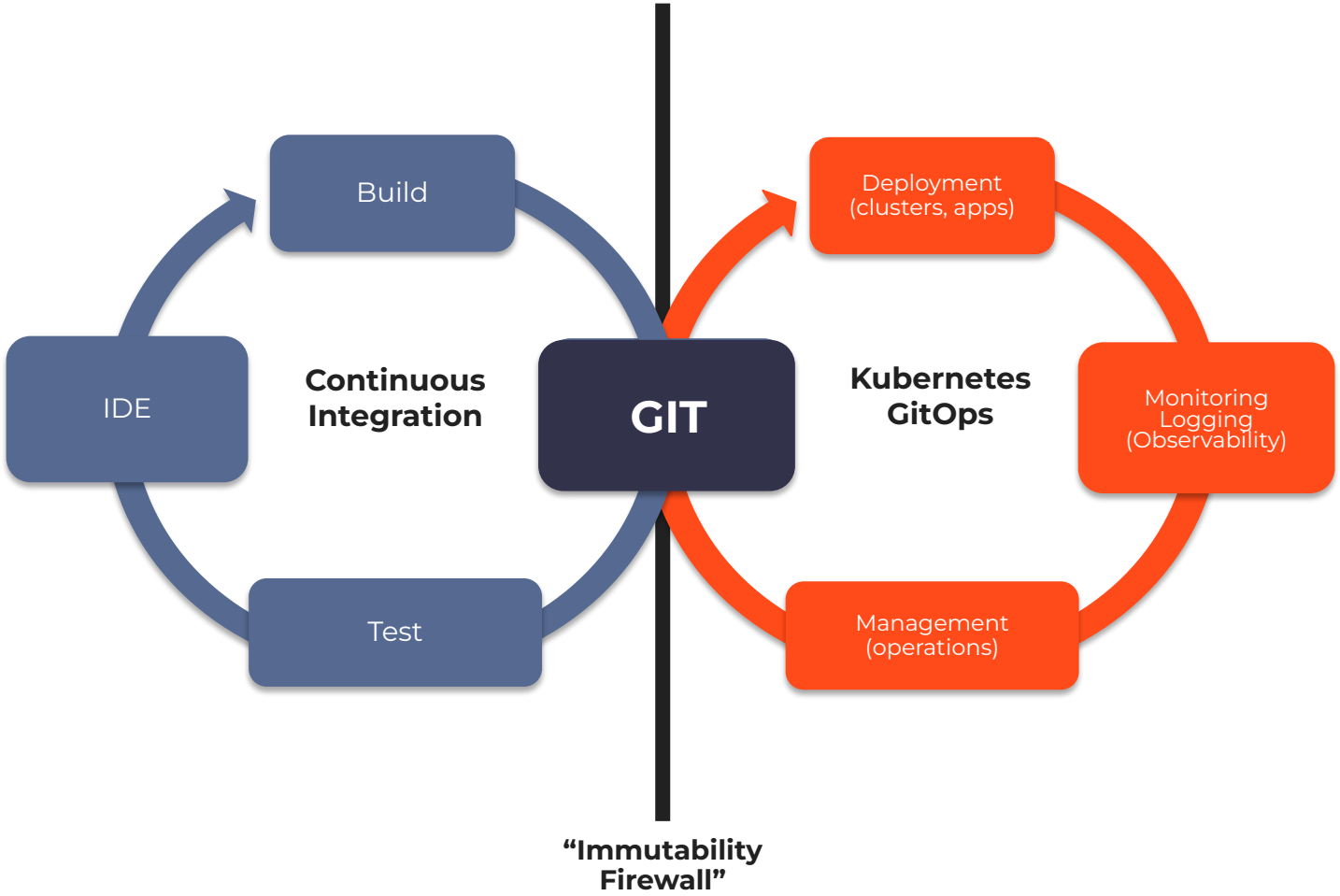
Container	Runs an image (immutable copy of your application code and all code dependencies) in an isolated environment.
Pod	A set of containers, co-scheduled on one machine. Mortal. Has pod IP. Has labels.
Deployment	Ensures a certain number of replicas of a pod are running across the cluster.
Service	Gets virtual IP, mapped to endpoints via labels. Named in DNS.
Namespace	Resource names are scoped to a Namespace. Logical boundary.

Intro to GitOps

OpenGitOps Principles

https://opengitops.dev

GitOps: A Cloud Native Operating Model



Unifying Deployment, Monitoring and Management.

Git as the single source of truth of a system's desired state

ALL intended operations are committed by pull request

ALL diffs between intended and observed state with automatic convergence

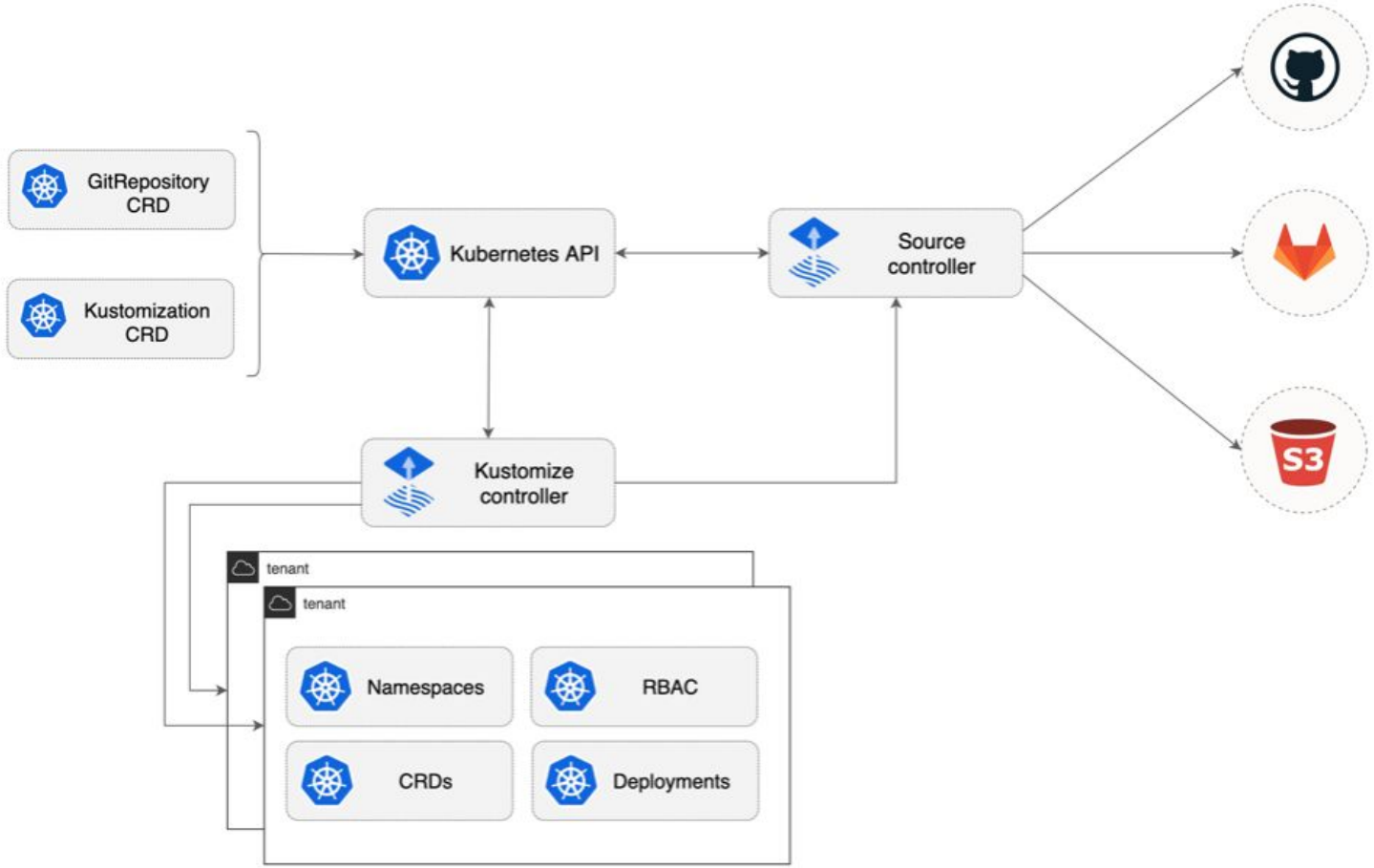
ALL changes are observable, verifiable, and auditable

Intro to GitOps

GitOps is the practice of using **Git** to store declaratively defined desired state and **Continuous Delivery agents (e.g. Flux)** to automate the reconciliation of current state to desired state. With GitOps, CI and CD are effectively decoupled.

Intro to Flux

- OSS CNCF Project
- Created at Weaveworks
- Runtime composed of Kubernetes Controllers + CRDs
- Flux keeps Kubernetes clusters in sync with sources of configuration (e.g. Git), and automatically + continuously reconciles running state to desired state



https://fluxcd.io/docs/components/kustomize/

Intro to Observability

Metrics, alerts, actionable,
dashboards, canned queries

Monitoring vs. Observability

Inspect, observe, explore,
trace, custom queries

Observability Instrumentation

Metrics

- Prometheus
  - OSS CNCF monitoring and alerting toolkit
  - Time series database for metrics collection created by SoundCloud

Data Visualization

- Grafana:
  - OSS metrics visualization dashboards
  - Created by Grafana Labs, CNCF Platinum Partner

Logging

- Fluent Bit:
  - OSS CNCF project for lightweight logs and metrics processing + forwarding
  - Sub-project under Fluentd umbrella created by Treasure Data

Workshop:

https://github.com/kubernetes101/kubecon2022

Workshop Recap

Well done! Today we've covered:

Kubernetes

- K3d cluster in GitHub Codespaces
- Kubernetes Resources

GitOps

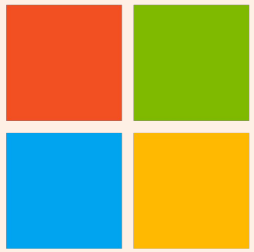
- Used Flux in your Kubernetes cluster to deploy a sample application as well as an observability stack via GitOps

Observability

- Monitored the sample application's metrics
- Ran integration and load tests to simulate application use and success/failures in serving traffic

Q&A

Find us at Kubecon!



Microsoft Azure

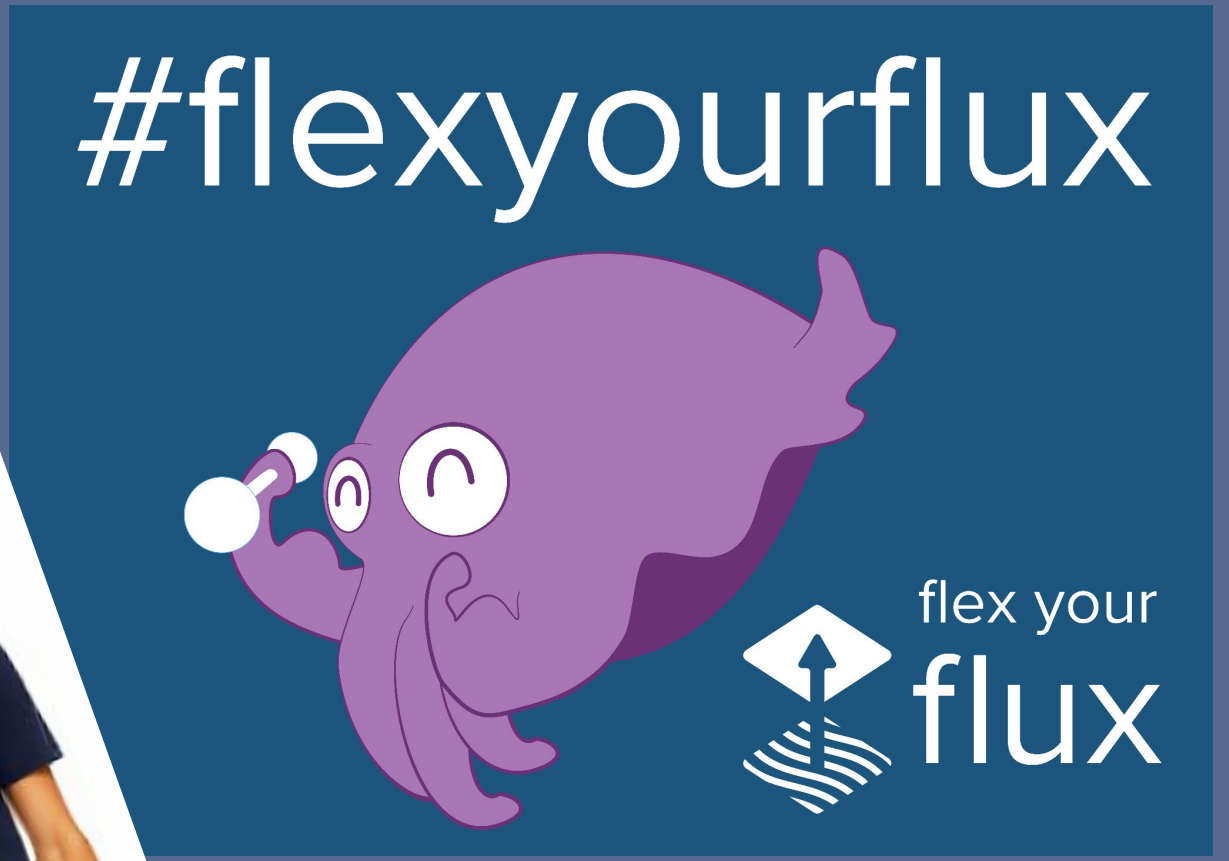
Solutions Showcase, Pavilion 2 (P12)

Check out the Activation Zone, chat with Microsoft experts, and enter the sweepstakes to win an Xbox!

Flux Booth at KubeCon EU 2022!

Join us Online and In Person!
Talks, office hours, booth prizes!
https://bit.ly/flux_kubeconEU2022

- **Monday:** Flux talks & gathering
- **Tuesday:** GitOpsCon
- **Wednesday - Friday**:
  Flux booth events
  all ***online*** and ***in person***!
  “Flex your Flux” Prizes,
  talks, demos, office hours,
  and more!



Weaveworks Booth - S44 Pavilion 2

Stop by the Weaveworks booth (#S44) in Pavilion 2 for:

- Demos on the latest features of **Weave GitOps** - specifically demonstrating trusted delivery using **policy as code** in your GitOps pipeline
- Pick up a **GitOps T-shirt** and stickers
- Enter our sweepstakes to win a pair of **Apple Pro AirPods**
- **Request a meeting** in our on-site meeting room with our GitOps experts to discuss your business needs

Thank You!

Joaquin Rodriguez
joaquin.rodriguez@microsoft.com
Twitter: @joaquinrdzv

Tiffany Wang
tiffany@weave.works
Twitter: @tiffanywang1

Additional Resources

Kubernetes

- https://kubernetes.io
- https://kubernetes.io/docs/reference/generated/kubernetes-api/v1.23/#-strong-api-groups-strong-
- https://kubernetes.io/docs/reference/using-api/
- https://kubernetes.io/docs/concepts/overview/components

GitOps

- https://fluxcd.io/docs/components/
- https://opengitops.dev

Observability

- https://prometheus.io
- http://grafana.com
- https://fluentbit.io

GitHub Codespaces

- https://github.com/features/codespaces