

# CNCF LINZ A TALE OF ROSES AND CONTAINERS: OUR KUBERNETES JOURNEY

26.03.2024 - Pasching

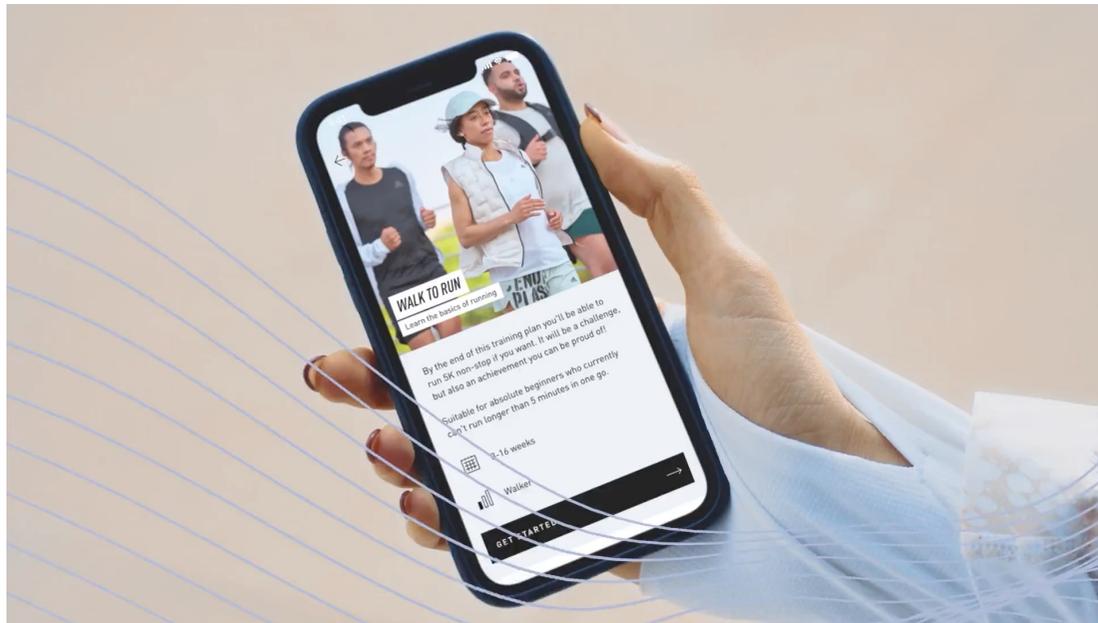
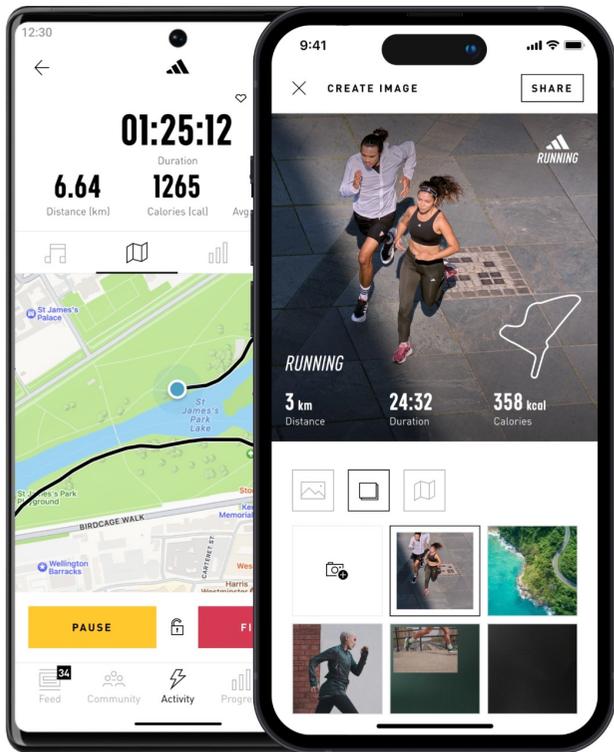


# ABOUT US



# ABOUT US

## BUILDING DIGITAL SPORTS EXPERIENCES FOR ADIDAS



# ALEXANDER LACKNER

INFRASTRUCTURE ENGINEER



- **JOINED ADIDAS RUNTASTIC IN MARCH 2020**
- **PASSIONATE ABOUT AUTOMATION AND CLOUD COMPUTING**
- **LOVES TO RUN, HIKE AND GAME** 🎮



# ARMIN DELIOMINI

HEAD OF INFRASTRUCTURE



- **JOINED (ADIDAS) RUNTASTIC IN JANUARY 2013**
- **PASSIONATE ABOUT OPEN SOURCE**
- **TOO OLD TO RUN, HIKE AND GAME** 🧑
- **YOUNG ENOUGH TO BEAT ALEX IN TABLE TENNIS** 🏓



## CONTENT

- 1. HOW IT ALL STARTED**
- 2. OUR ROSE JOURNEY**
- 3. ADOPTING CLOUD NATIVE AND K8S**
- 4. THE FUTURE**
- 5. SUMMARY**

# HOW IT ALL STARTED



# HOW IT ALL STARTED

"SERVERS" WITH SURROUND SOUND

- **CHEAP 'N' EASY**
- **AUTOMATION FIRST STEPS**
- **DIRTY, DIRTY, DIRTY**
  
- **ROOT SERVER**
- **DESKTOP PC WITH DOLBY SURROUND SOUND**
- **MORE OR LESS CLOUD NATIVE STACK**



# HOW IT ALL STARTED

OUR OWN DATACENTER - WE LOVED IT

- **WE LEARNED A LOT**
- **WE AUTOMATED A LOT**
- **WE BROKE A LOT**
  
- **OPENNEBULA (KVM)**
- **CHEF**
- **STATIC DEV ENVS**



# HOW IT ALL STARTED

OUR OWN DATACENTER - WE MOVED IT

- **NO DOWNTIME MIGRATION**
  - migration via car ...
- **WE AUTOMATED A LOT**
- **AUTOMATED DEV ENVIRONMENTS**
- **SELF BUILT SOLUTION (RENO)**



# OUR ROSE JOURNEY



**WHAT DO YOU THINK ROSE  
STANDS FOR? 🤔**



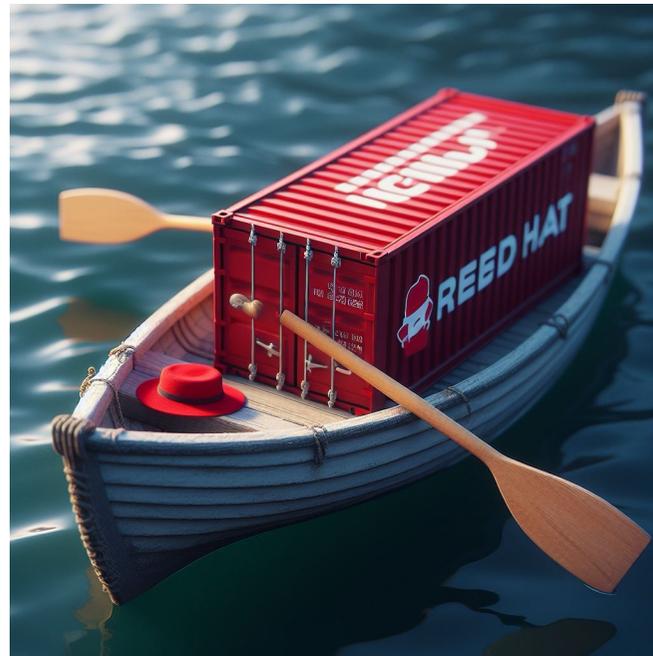
**RUNTASTIC OPENSIFT ENVIRONMENT**



# ROSE

RUNTASTIC OPENSIFT ENVIRONMENT

- **OUR MOVE TO CONTAINERS**
- **KUBERNETES BUT ENTERPRISE - \$\$\$**
- **SLACK INTEGRATION :)**



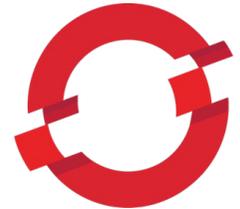
# ADOPTING CLOUD NATIVE AND K8S



# ADOPTING CLOUD NATIVE AND K8S

WHY MOVE ON?

- **STUCK ON OPENSIFT 3.11**
  - Need to redeploy the whole cluster for 4.x
- **BARE-METAL SETUP**
- **NO PROPER AUTOMATION**
  - Ansible for updates which took forever



# ADOPTING CLOUD NATIVE AND K8S

## FIRST STEPS

- **CHECKING OUT THE LANDSCAPE**
- **SEARCHING FOR ALTERNATIVES**
  - OKD
  - Kubermatic
  - Giant Swarm
  - Kubespray
- **BUILDING A POC**

okd



# ADOPTING CLOUD NATIVE AND K8S

SETUP WITH KUBERMATIC

- **WHY DID WE CHOOSE IT**

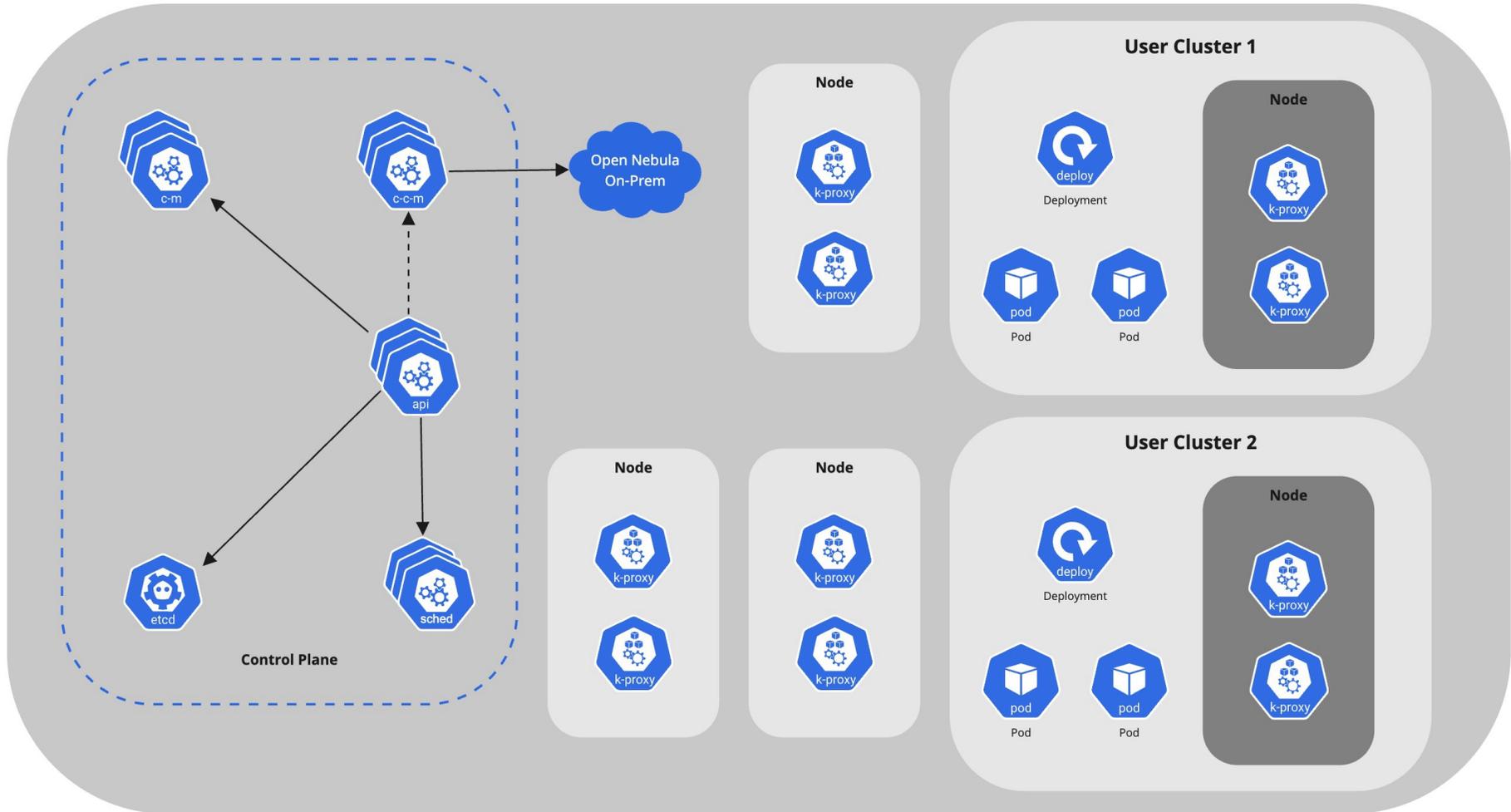
- Existing Hardware / support for on-premise
- Great community
- Integrates with open nebula platform → contribution
- Vanilla k8s with management UI
- Cilium support

- **TWO MANAGEMENT CLUSTERS**

- **ONE USER CLUSTER PER ENVIRONMENT**



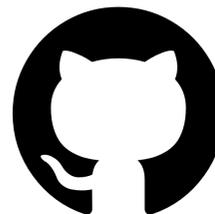
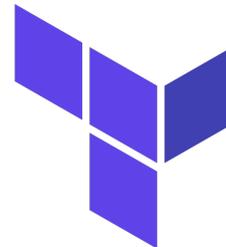
# Management Cluster



# ADOPTING CLOUD NATIVE AND K8S

GITOPS & INFRASTRUCTURE AS CODE (IAC)

- **IAC: TERRAFORM**
- **GITOPS: FLUX**
- **UPDATES: GITHUB + RENOVATE**
- **DEV CI/CD: TEKTON**



# ADOPTING CLOUD NATIVE AND K8S

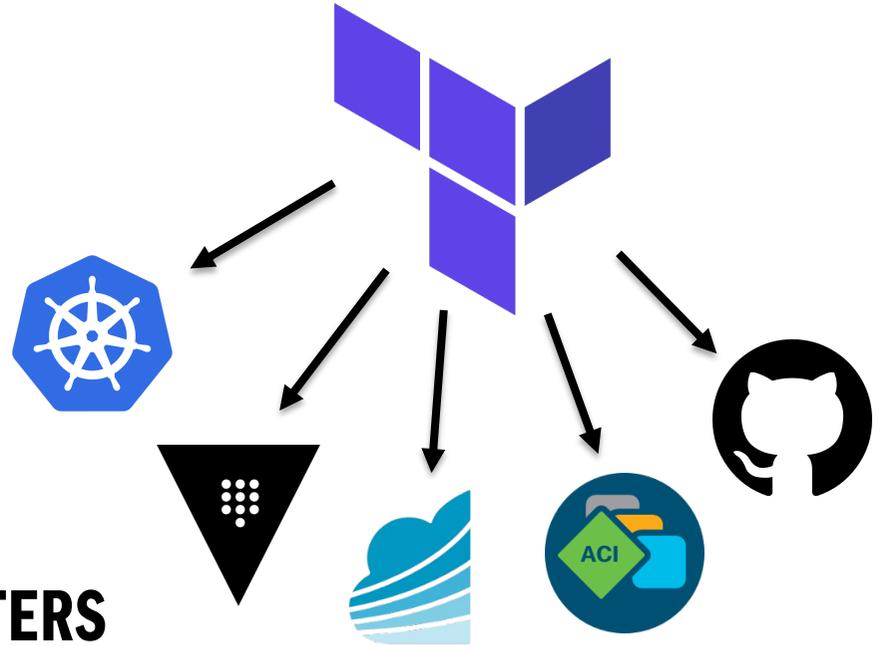
INFRASTRUCTURE AS CODE (IAC)

- **CUSTOM TERRAFORM MODULE**

- Kubernetes resources (cluster, ...)
- Private Cloud
- Networking
- Secrets and Permissions
- Repository files

- **46 VARIABLES**

- **CAN UPGRADE/SCALE K8S CLUSTERS**



# ADOPTING CLOUD NATIVE AND K8S



## INFRASTRUCTURE AS CODE (IAC)

```
k8s-user-cluster.auto.tfvars

## The vlan that should be used
rt_network_vlan = "42"

## The ACI gateway IP in cidr notation
rt_network_subnet_gateway_ip = "10.42.42.254/24"

## Name of the k8s management cluster (k8s or k8stest)
rt_management_cluster_name = "k8stest"

## Short name of the k8s user cluster
rt_cluster_name_short = "bob"

## Cluster Version
rt_cluster_version = "1.28.6"

## CNI Plugin settings
rt_cluster_cni_plugin = {
  type    = "cilium"
  version = "1.14.3"
}
```

# ADOPTING CLOUD NATIVE AND K8S

GITOPS

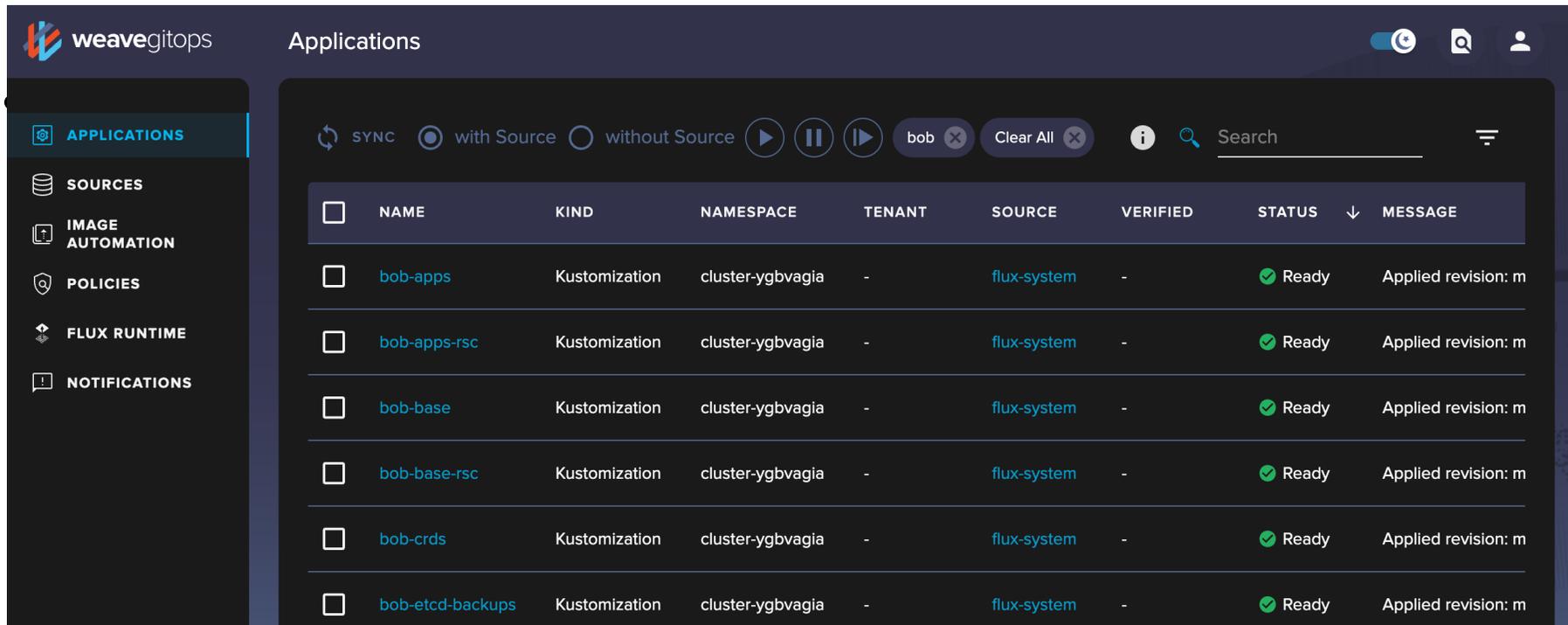
- **FLUX**

- Natively supports Helm
- Usable without an UI
- "UNIX" Style
- Used for rolling out applications and services



# ADOPTING CLOUD NATIVE AND K8S

## GITOPS



The screenshot shows the Weave GitOps dashboard interface. On the left is a navigation sidebar with menu items: APPLICATIONS (selected), SOURCES, IMAGE AUTOMATION, POLICIES, FLUX RUNTIME, and NOTIFICATIONS. The main area is titled 'Applications' and contains a table of application resources. Above the table are controls for synchronization (SYNC), source selection (with Source, without Source), and playback (play, pause, stop). There are also buttons for 'bob' and 'Clear All', an information icon, a search bar, and a menu icon.

<input type="checkbox"/>	NAME	KIND	NAMESPACE	TENANT	SOURCE	VERIFIED	STATUS	MESSAGE
<input type="checkbox"/>	bob-apps	Kustomization	cluster-ygbvagia	-	flux-system	-	Ready	Applied revision: m
<input type="checkbox"/>	bob-apps-rsc	Kustomization	cluster-ygbvagia	-	flux-system	-	Ready	Applied revision: m
<input type="checkbox"/>	bob-base	Kustomization	cluster-ygbvagia	-	flux-system	-	Ready	Applied revision: m
<input type="checkbox"/>	bob-base-rsc	Kustomization	cluster-ygbvagia	-	flux-system	-	Ready	Applied revision: m
<input type="checkbox"/>	bob-crds	Kustomization	cluster-ygbvagia	-	flux-system	-	Ready	Applied revision: m
<input type="checkbox"/>	bob-etcd-backups	Kustomization	cluster-ygbvagia	-	flux-system	-	Ready	Applied revision: m

# ADOPTING CLOUD NATIVE AND K8S



## UPDATES



- **APPLICATIONS / HELM CHARTS**
  - Pull Requests created by Renovate

renovate bot commented on Feb 20 · edited

MENDRenovate

This PR contains the following updates:

Package	Update	Change
<a href="#">kubernetes-cert-manager</a>	minor	v2.24.2 -> v2.25.0

**Release Notes**

► kubernetes/kubernetes (kubernetes-cert-manager)

# ADOPTING CLOUD NATIVE AND K8S

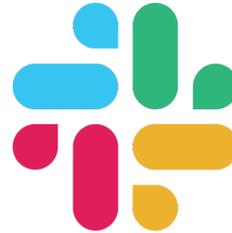
## MONITORING

- **GRAFANA AGENT**

- Prometheus for metrics (push model)
- Loki for Logs
- Grafana for visualization

- **ON CALL WITH OPSGENIE**

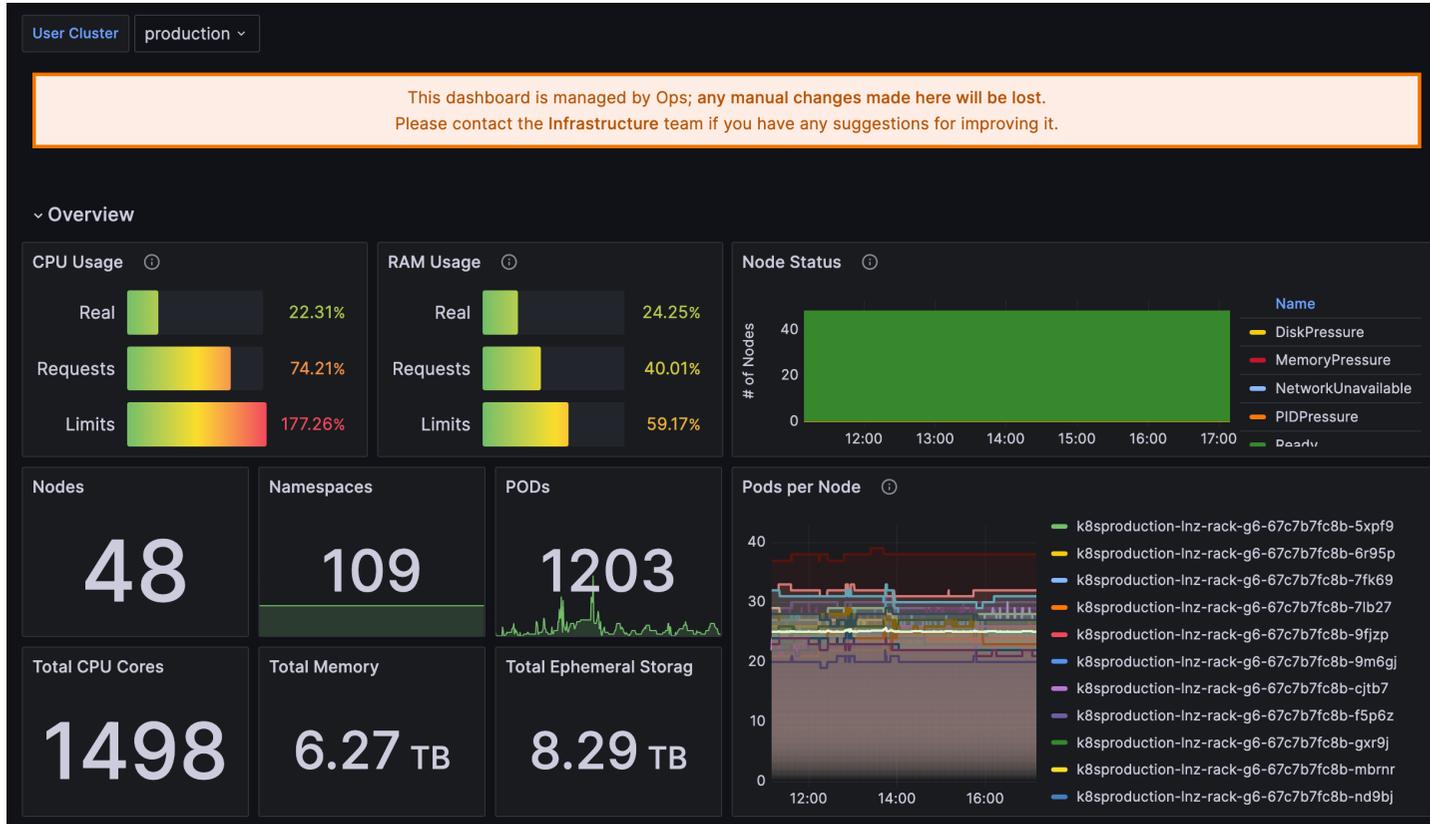
- **NOTIFICATIONS VIA SLACK**



# ADOPTING CLOUD NATIVE AND K8S



## MONITORING



# ADOPTING CLOUD NATIVE AND K8S



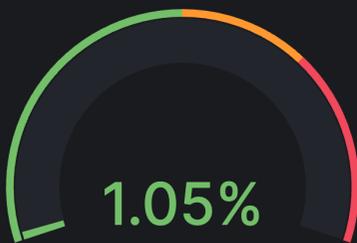
## MONITORING

Cluster bob Namespace All

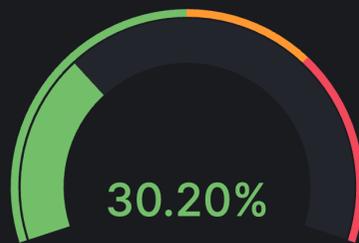
This dashboard is managed by Ops; any manual changes made here will be lost.  
Please contact the Infrastructure team if you have any suggestions for improving it.

### Overview

Namespace(s) usage on total cluster CPU in %



Namespace(s) usage on total cluster RAM in %



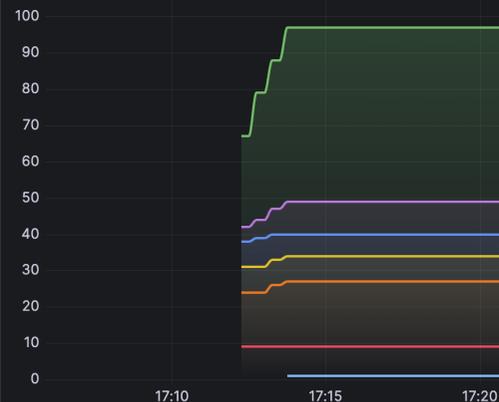
Namespace(s) CPU Usage in cores

Real	Requests	Limits	Cluster Total
0.233	3.32	10.4	12

Namespace(s) RAM Usage in bytes

Real	Requests	Limits	Cluster Total
6.44 GiB	6.49 GiB	8.09 GiB	23.3 GiB

Kubernetes Resource Count



Name	Min	Max	Mean
Running Pods	67	97	93.7
Secrets	42	49	48.2
Configmaps	38	40	39.8
Services	31	34	33.6
Deployments	24	27	26.6
Daemonsets	9	9	9
Ingresses	1	1	1

# ADOPTING CLOUD NATIVE AND K8S



## MONITORING



Opsgenie EU APP 3:29 PM

#7460: [Prometheus]: alice - Certificate opencost-tls on namespace opencost expires

The SSL certificate opencost-tls on namespace opencost of cluster alice expires in 21 days!

Priority

P2

Routed Teams

k8s

# ADOPTING CLOUD NATIVE AND K8S

## MONITORING



Outline **Loki Test** Split Add to dashboard Last 1 hour Run query Live

**A** (Loki Test) ⌕ 📄 👁 🗑 ⋮

Kick start your query Label browser Explain query  Builder Code

```
{namespace="random-number-generator",user_cluster="bob"}
```

> Options Type: Range Line limit: 1000 ⌚ This query will process approximately 1.0 KiB.

+ Add query ↻ Query history 🔍 Query inspector

### Logs volume

Time	Logs Volume
10:00	1.0
10:05	1.0
10:10	1.0
10:15	1.0
10:20	1.0
10:25	1.0
10:30	1.0
10:35	1.0
10:40	1.0
10:45	1.0
10:50	1.0
10:55	1.0

### Logs

Time  Unique labels  Wrap lines  Prettify JSON  Deduplication **None** Exact Numbers Signature Display results **Newest first** Oldest first

Common labels: eventhandler ygbvagia eventhandler eventhandler integrations/kubernetes/eventha... random-number-generator bob Line limit: 1000 (12 returned) Total bytes processed: 27.9 kB 📄 Download

```
> 2024-03-22 10:55:02.000 name=docker.io kind=ExternalSecret objectAPIVersion=external-secrets.io/v1beta1 objectRV=6575 eventRV=1772637 reportingcontroller=external-secrets sourcecomponent=external-secrets reason=Updated type=Normal count=3882 msg="Updated Secret"
> 2024-03-22 10:50:02.000 name=docker.io kind=ExternalSecret objectAPIVersion=external-secrets.io/v1beta1 objectRV=6575 eventRV=1770378 reportingcontroller=external-secrets sourcecomponent=external-secrets reason=Updated type=Normal count=3877 msg="Updated Secret"
```

# ADOPTING CLOUD NATIVE AND K8S

## OTHER COMPONENTS / TOOLS

- **KYVERNO**
- **EXTERNAL SECRETS OPERATOR**
- **CERT MANAGER**
- **EXTERNAL DNS**
- **PIRAEUS**
- ...



# ADOPTING CLOUD NATIVE AND K8S

## MIGRATION

- **SERVICE BY SERVICE**
- **NGINX PROXY**
- **TOOK ABOUT 2 MONTHS**
- **NO BIG INCIDENTS**



# CLUSTER CREATION DEMO



# THE FUTURE



# THE FUTURE

## GOING TO THE CLOUD

- **MOVING OUR WORKLOADS TO AWS**

- Services
- Databases
- Storage
- ...



- **USING THE ADIDAS K8S STACK – GIANT SWARM**

- **LOOKING INTO NEW CNCF TECHNOLOGIES**



# SUMMARY



# SUMMARY



MOVING ON FROM ROSE



**UP TO DATE VANILLA K8S**



**EASIER SCALING**



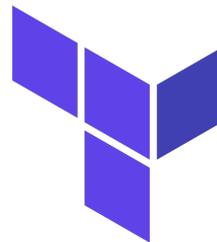
**BETTER EXPERIENCE FOR DEVELOPERS**



**EASIER MAINTENANCE FOR OPERATIONS**



**FOUNDATIONS TO TRANSFER TO THE CLOUD**



# SUMMARY



## TEAM EFFORT

- **THANKS TO THE TEAM**

- Andreas
- Niko
- Foxy 🦊
- Shay
- And others!



# LINK

TO OUR GITHUB



**THANK YOU**  
**QUESTIONS?**

