



# Intro to



# K3S

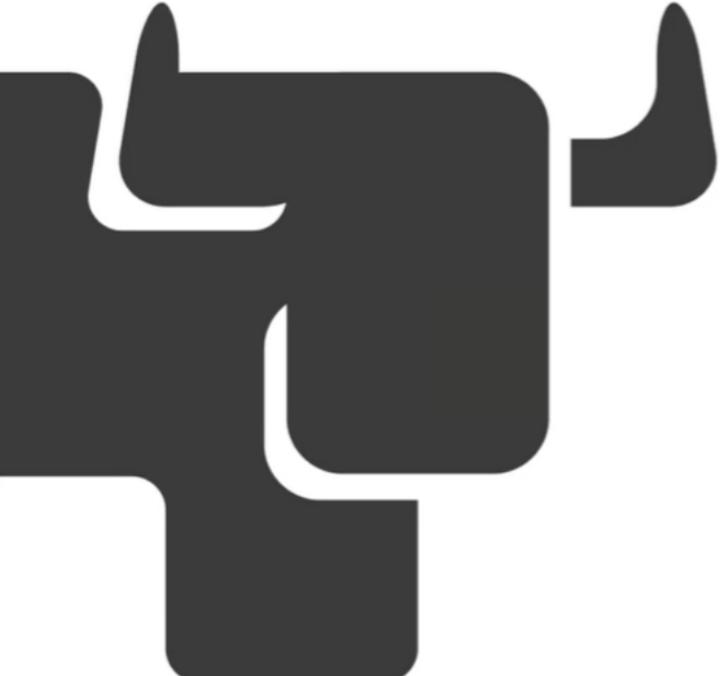
## Online Training



**Mark Abrams**  
Field Engineer  
Rancher



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Marketing Manager  
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Slack: @matthew



## Rancher k3s Online Training

- Trying to keep this to 1 hour
- Questions are always welcome
- Use the questions tab to write your questions
- We may respond to all, so mark your question as private if needed.

This session is being recorded!



Introducing Rancher's New Multi-Tenant Prometheus Support

RANCHER

#RancherMeetup • December 19, 2018

Online Meetups and Webinars

Rancher Labs - 1 / 37

December 2018 Online Meetup: Introducing Rancher's New Multi-Tenant Prometheus Support

November 2018 Online Meetup: Building an Application Catalog with Rancher Labs

October 2018 Online Meetup: Migrating from Rancher 1.6 to Rancher

September 2018 Online Meetup: Understanding Storage Options for Rancher Labs

August 2018 Online Meetup: Building a CI/CD Pipeline with Kubernetes and Rancher Labs

June 2018 Online Meetup: Kubernetes Networking Master Class

Rancher Labs

1

2

3

4

5

6

<http://youtube.com/c/rancher>

# Resources – Slack and Forums

<http://slack.rancher.io>

Rancher Users - [Jump to...](#)

# All Unreads

Channels

- # events
- # general
- # k3s**
- # masterclass
- # onlinemeetup
- # onlinetraining
- # random
- # training-0110
- # training-0124
- # training-0131
- # training-0207

#k3s

2 | 8,398 | 9,2 | Add a topic

Today

during installation, the user running the install-script needs to have the environment variables set once it is installed, I had to edit the k3s.service.env file and add the variables there as well, then restart k3s and manually kill all the containerd-shim processes to restart the installation procedure.

Ritesh Arya 8:14 AM Hey mike can you please write down the procedure when you will be free it will be really helpful. Thanks 😊

Mickie 9:16 AM This is what I did. If you can get the k3s install script to populate the k3s.service.env, this shouldn't be necessary, but I didn't have time to experiment with that.  
- export https\_proxy=<proxy url>  
- curl -sL https://get.k3s.io | sh  
- Edit /etc/systemd/system/k3s.service.env and add the "https\_proxy=<proxy url>" line  
- sudo systemctl stop k3s  
- sudo kill containerd  
- sudo kill containerd-shim  
- sudo systemctl start k3s {edited}

erik 9:21 AM ^ If that helps @Ritesh Arya we can update the install script to preserve the proxy environment, probably a good idea to default to that behavior

#k3s

<http://forums.rancher.com>

RANCHER

all categories [Categories](#) Latest New (13) Unread Top + New Topic

Category Topics Latest

Announcements 8 / month 1 new Rancher Secret Support 1 24m

General 21 / month 2 new Update load balancer tags via API 2 2h

Rancher deployment - many environments 5 3h

Beta Lounge 85 GlusterFS / BeeGFS on Rancher? 2 6h

Rancher 64 / month 10 new Custom catalog not showing templates 0 7h

RancherOS 13 / month Rancher Ingress controller 0 7h

Longhorn 3 / month Kubernetes 1.87 1 8h

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## Upcoming Classes

**Weekly Online Kubernetes and Rancher Intro Training**  
Thursday January 16, 2020

Ready to get some training on using Kubernetes and Rancher?

This introductory class is designed for technical experts, and provides a great starting point for new users to get a hands-on overview of Kubernetes and how to set up a Kubernetes deployment on Rancher.

Key skills we will demonstrate include:

- Essential Kubernetes Concepts
- The key components of a Kubernetes deployment
- Deploying and scaling a containerized application with Kubernetes, Helm, and Docker
- Deploying Rancher
- Configuring Access Control
- Connecting Repositories
- Managing Container Networking and Service Discovery
- Alerts, logging, and resource management
- Basics of Kubernetes storage
- Using the Rancher UI and API

Please register for as many of these sessions as you'd like. Bring any technical questions you're having and we're happy to answer them as best we can.

Details:

- Date: Thursday, January 16, 2020
- Time: 1:00pm-3:00pm Eastern Time

Yes, I want to join the training

First Name\*

Last Name\*

Company Name\*

Number of Employees\*  
 (Phone Number)

Job Title\*  
 Email\*

Phone Number

Country\*  
 (Phone Number)

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**January Online Meetup:  
Securing Your Production-Grade Kubernetes Clusters Using Rancher**  
Wednesday January 22, 2020

### Presenters



Adrian Gelas  
Director of Community



Bill Maxwell  
Senior Product Manager



Prachi Desai  
Principal Software Engineer  
Rancher

As DevOps teams deploy Kubernetes in production using Rancher, enterprises must focus on the runtime security and compliance requirements of their cloud-native platforms.

Starting with Rancher 2.2, we published self-assessment and hardening guides for the most popular cloud providers to help you pass the CIS Kubernetes benchmark. Identifying gaps and pain points in the process, Rancher engineering added additional controls to both Rancher and K8s to simplify the process.

Since the release of Rancher 2.2, administrators have been able to define the "Template" for security in Rancher is configured in a standard organizational specification. With this feature, administrators can allow their users to easily provision secure clusters and harden existing ones as part of the cluster provisioning process.

During this online meetup, Bill Maxwell (Sr. Product Manager) and Prachi Desai (Principal Software Engineer) will give an overview of the current state of security-related features in Rancher, and demonstrate the integration of our latest CIS benchmarks (including both Rancher 2.4 stable).

### Join the Online Meetup

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 (Phone Number)

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 Email\*

Country\*  
 (Phone Number)

Would you like us to auto-enroll you in all future Rancher online meetups?  Submit

**Kubernetes Master Class:  
How to harden your Kubernetes Clusters with Rancher**  
Tuesday January 28, 2020

### Presenters



Adrian Gelas  
Senior Software Architect  
Rancher



Prachi Desai  
Principal Software Engineer  
Rancher

As enterprises accelerate their adoption of containers and Kubernetes, they need to take necessary steps to protect such a critical part of their compute infrastructure. But not everyone has the same level of expertise. Rancher software engineers often ask for different levels of granular control on specific configurations. This masterclass will change that by providing common sense recommendations using Rancher's current best practice security guidance. Topics to be covered will include:

- Implementing role-based access control (RBAC)
- Using namespaces to establish security boundaries
- Separating sensitive workloads
- Securing cloud metadata access
- Cluster-wide pod security policies
- Node security best practices
- Enabling audit logging
- Keeping your Kubernetes versions up-to-date

Details:  
Date: Wednesday, January 29, 2020

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Phone Number

Country\*  
 (Phone Number)

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<https://info.rancher.com/rancher-kubernetes-online-training>

<https://info.rancher.com/online-meetup-securing-production-k8s-clusters>

<https://info.rancher.com/security-best-practices-harden-kubernetes-clusters>



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# K3s Master Class

January 15<sup>th</sup>, 2020

K3s Fundamentals

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Single Node Demo

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HA Demo

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Use Cases

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Multi-cluster Management

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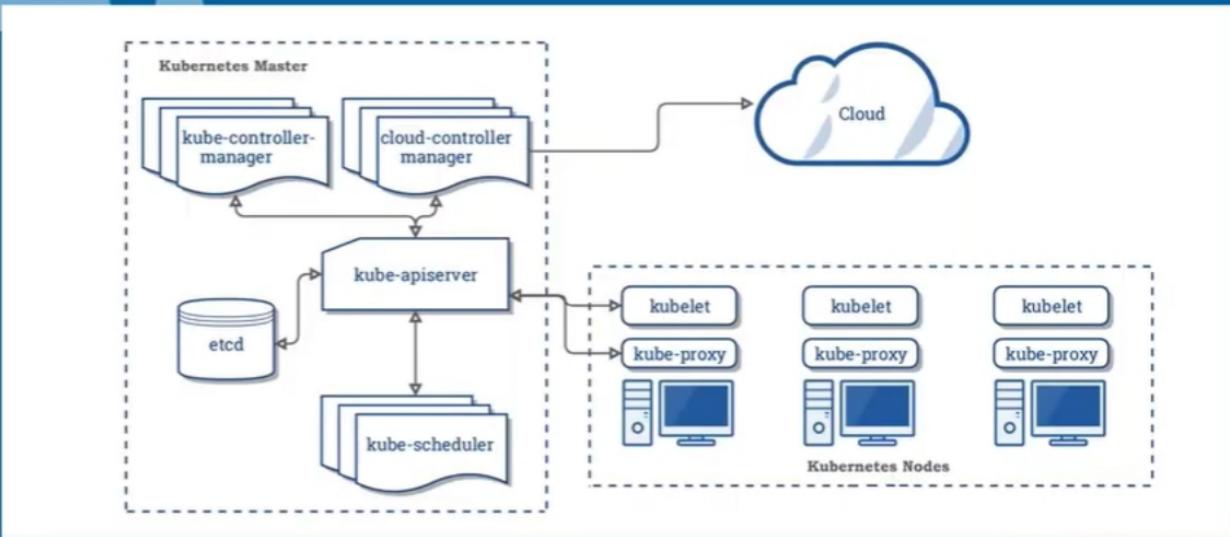
# K3s in Production

Mark Abrams  
Field Engineer

January 15<sup>th</sup>, 2020

# K3s Fundamentals

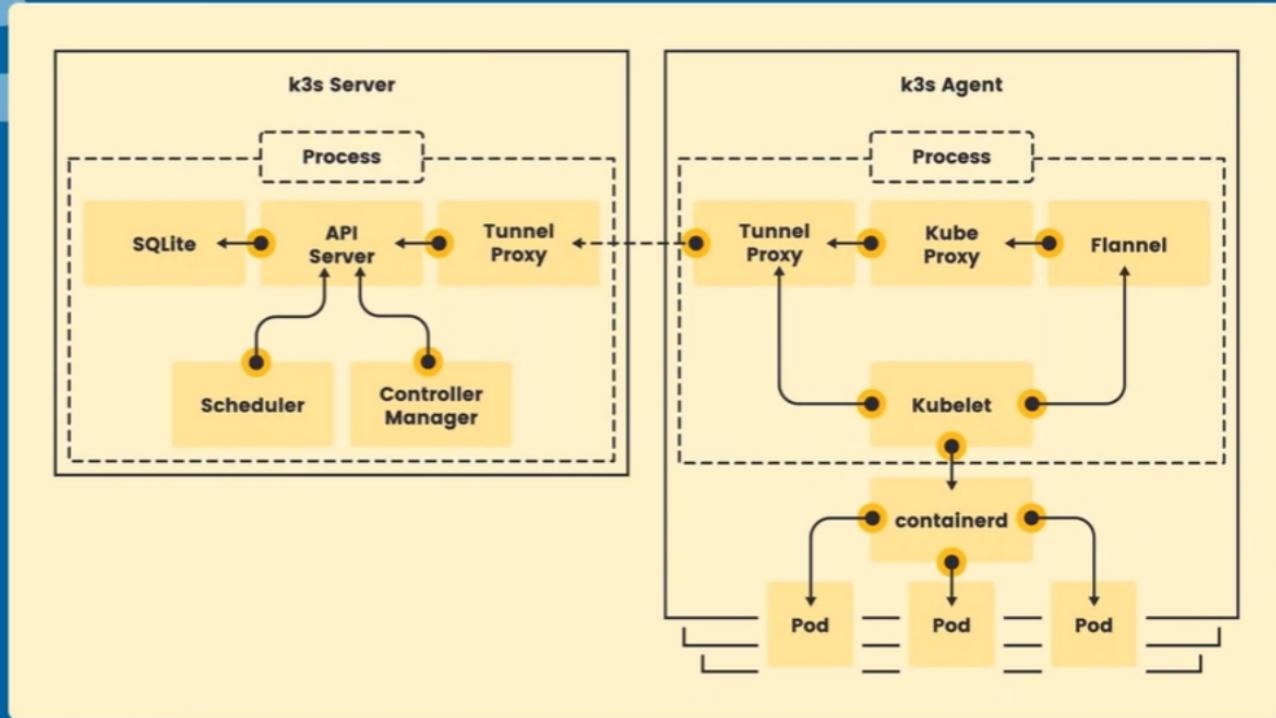
# K8s Architecture



# K3s Architecture



K3S



# K3s - Lightweight Kubernetes

v0.0.1 Out of the Box

- Low Memory/CPU footprint
  - < 512 MB
  - k8s components in single binary
- Multi-Arch distribution
  - x86\_64
  - Arm7
  - Arm8
- Ingress controller
  - Remove dependency on docker
  - Remove dependency on etcd
  - Remove 3M lines
    - In-tree storage providers
    - In-tree cloud providers
    - Alpha features
    - Legacy and non-default features

# Single Node Demo

```
markabrams — pi@4bplus003: ~ — ssh pi@4bplus003 — 80x24
pi@4bplus003:~ $ uname -a
Linux 4bplus003 4.19.88-v8+ #1284 SMP PREEMPT Wed Dec 11 13:57:50 GMT 2019 aarch
64 GNU/Linux
pi@4bplus003:~ $ cat /etc/os-release
PRETTY_NAME="Raspbian GNU/Linux 10 (buster)"
NAME="Raspbian GNU/Linux"
VERSION_ID="10"
VERSION="10 (buster)"
VERSION_CODENAME=buster
ID=raspbian
ID_LIKE=debian
HOME_URL="http://www.raspbian.org/"
SUPPORT_URL="http://www.raspbian.org/RaspbianForums"
BUG_REPORT_URL="http://www.raspbian.org/RaspbianBugs"
pi@4bplus003:~ $ curl -L https://github.com/rancher/k3s/releases/download/v1.17.0+k3s.1/k3s-arm64 -o k3s
```

```
markabrams — pi@4bplus003: ~ -- ssh pi@4bplus003 — 80x24
pi@4bplus003:~ $ ls
adafruit-pitft.sh  Desktop  Documents  k3s  Music  Public  Templates
bin                dev      Downloads  MagPi  Pictures  RetroPie  Videos
pi@4bplus003:~ $ ls -l
total 46984
-rwxr-xr-x 1 pi pi    22797 Jan  6 13:00 adafruit-pitft.sh
drwxr-xr-x 2 pi pi    4096 Jan 11 12:19 bin
drwxr-xr-x 2 pi pi    4096 Sep 25 20:31 Desktop
drwxr-xr-x 5 pi pi    4096 Jan 11 12:38 dev
drwxr-xr-x 2 pi pi    4096 Sep 25 20:31 Documents
drwxr-xr-x 2 pi pi    4096 Sep 25 20:31 Downloads
-rw-r--r-- 1 pi pi  48037888 Jan 15 13:17 k3s
drwxr-xr-x 2 pi pi    4096 Sep 25 20:18 MagPi
drwxr-xr-x 2 pi pi    4096 Sep 25 20:31 Music
drwxr-xr-x 2 pi pi    4096 Sep 25 20:31 Pictures
drwxr-xr-x 2 pi pi    4096 Sep 25 20:31 Public
drwxr-xr-x 5 pi pi    4096 Jan  6 14:56 RetroPie
drwxr-xr-x 2 pi pi    4096 Sep 25 20:31 Templates
drwxr-xr-x 2 pi pi    4096 Sep 25 20:31 Videos
pi@4bplus003:~ $ chmod +x ./k3s
pi@4bplus003:~ $ sudo k3s server -l k3s.log &
[!] 4091
pi@4bplus003:~ $
```

```
markabrams — pi@4bplus003: ~ — ssh pi@4bplus003 — 80x24
bin          dev      Downloads  MagPi  Pictures  RetroPie  Videos
pi@4bplus003:~ $ ls -l
total 46984
-rwxr-xr-x 1 pi pi    22797 Jan  6 13:00 adafruit-pitft.sh
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drwxr-xr-x 2 pi pi     4096 Sep 25 20:31 Desktop
drwxr-xr-x 5 pi pi     4096 Jan 11 12:38 dev
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drwxr-xr-x 2 pi pi     4096 Sep 25 20:31 Videos
pi@4bplus003:~ $ chmod +x ./k3s
pi@4bplus003:~ $ sudo k3s server -l k3s.log &
[1] 4091
pi@4bplus003:~ $ sudo k3s kubectl get node
NAME      STATUS   ROLES     AGE   VERSION
4bplus003  Ready    master    8d    v1.17.0+k3s.1
pi@4bplus003:~ $
```

# K3s High Availability (HA)

# K3s GA - Lightweight Kubernetes

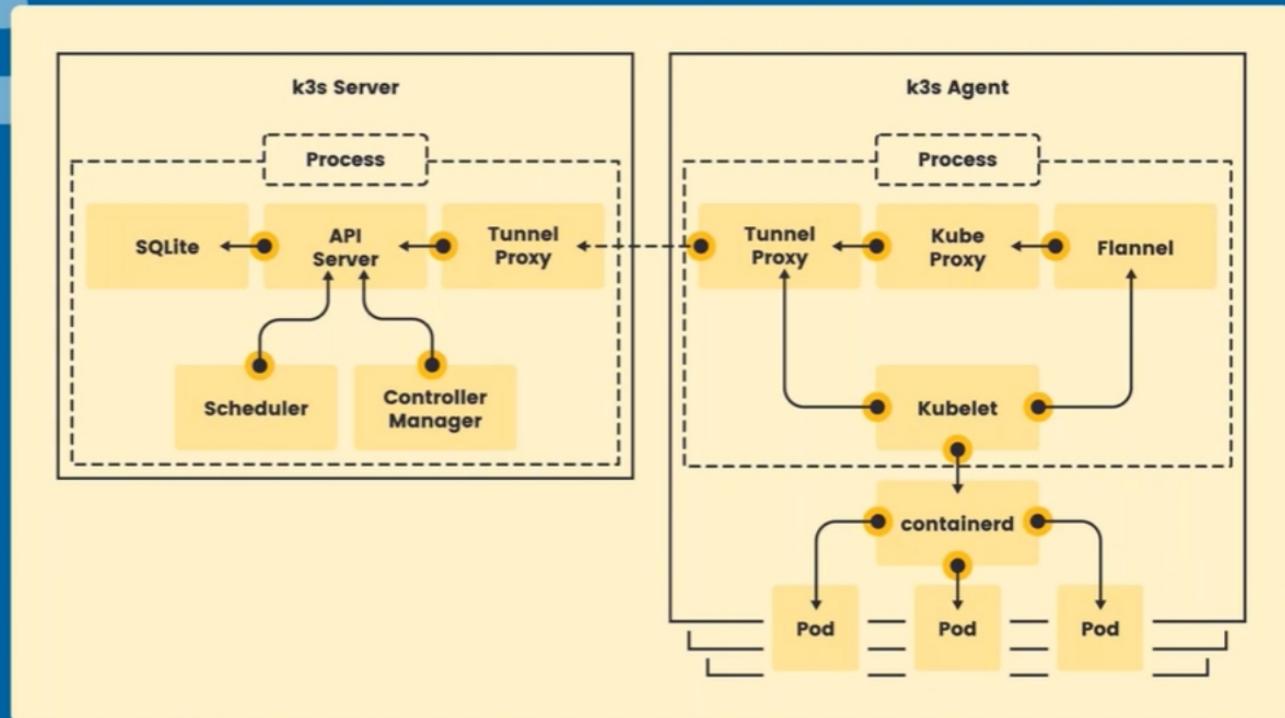
v1.0.0 Out of the Box

- Low Memory/CPU footprint
  - < 512 MB
  - k8s components in single binary
- Multi-Arch distribution
  - x86\_64
  - Arm7
  - Arm8
- Ingress controller
- Helm Controller
- Service Load Balancer
- Local Storage Provider
- Expanded data store options
  - Embedded SQLite
  - External DB
    - MySQL
    - PostgreSQL
  - Embedded Dqlite
- Air-gap installation

# Architecture



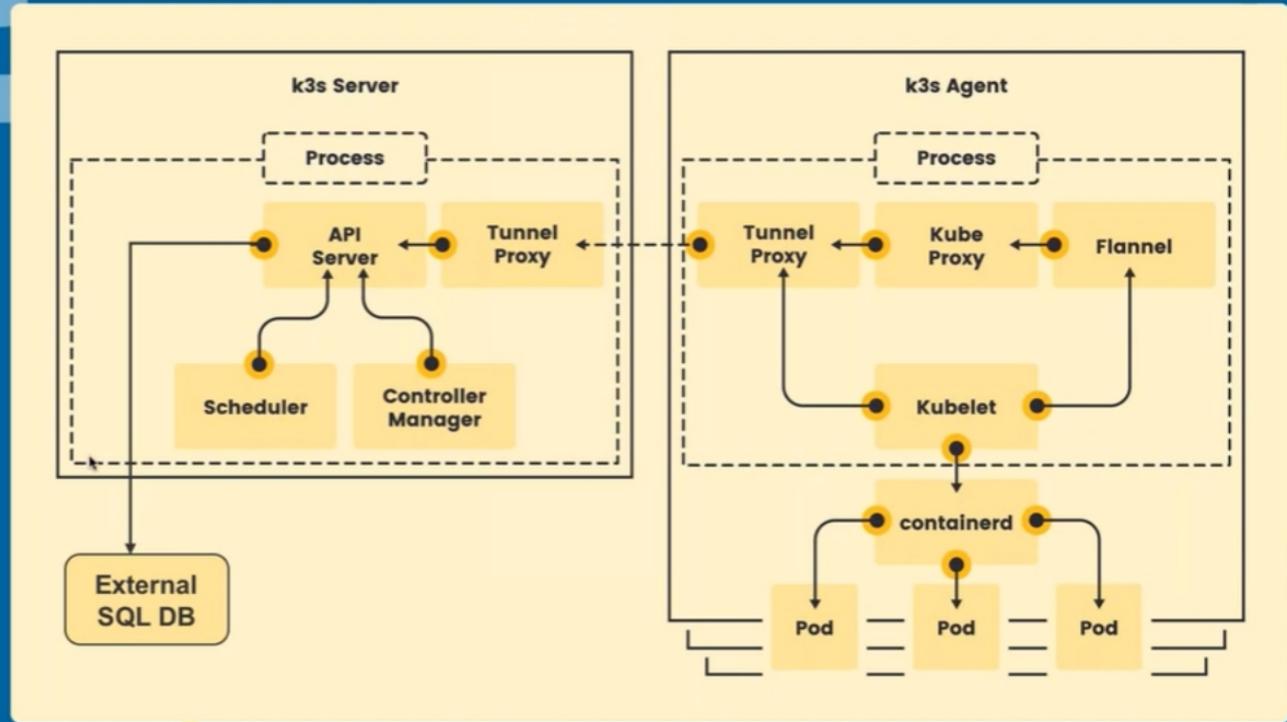
K3S



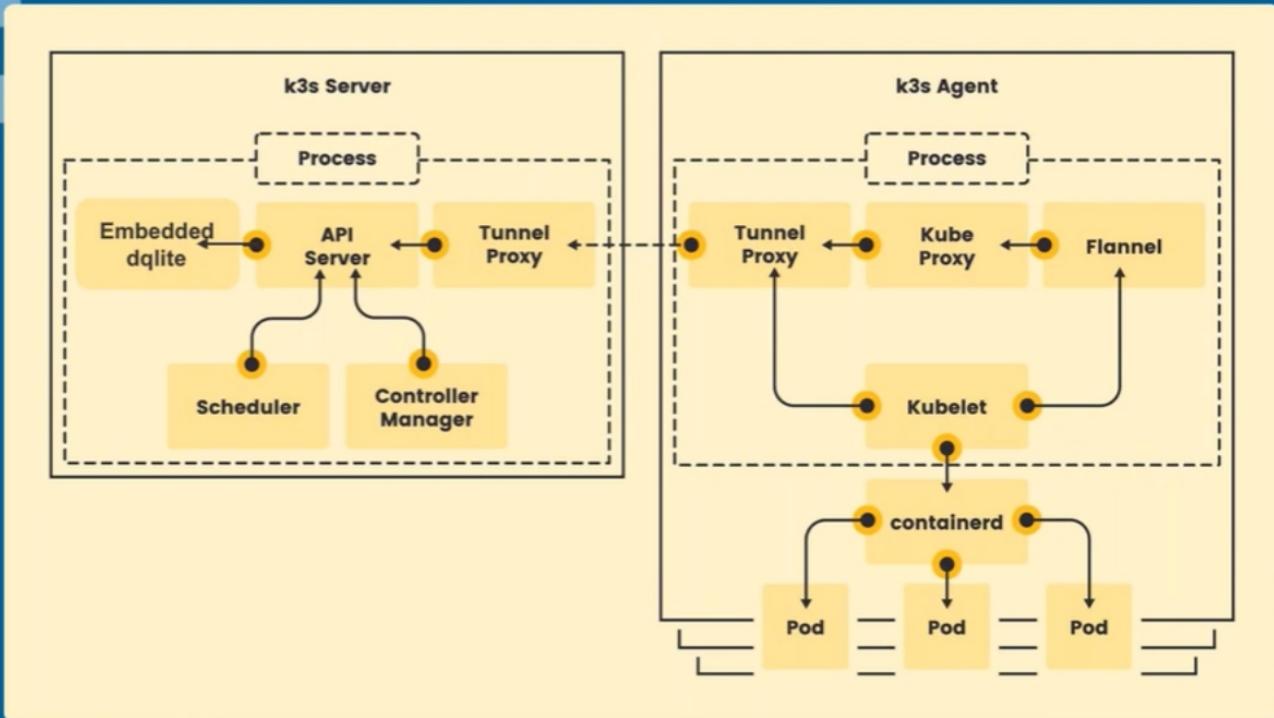
# Architecture – HA



K3S



# Architecture – HA Embedded (experimental)



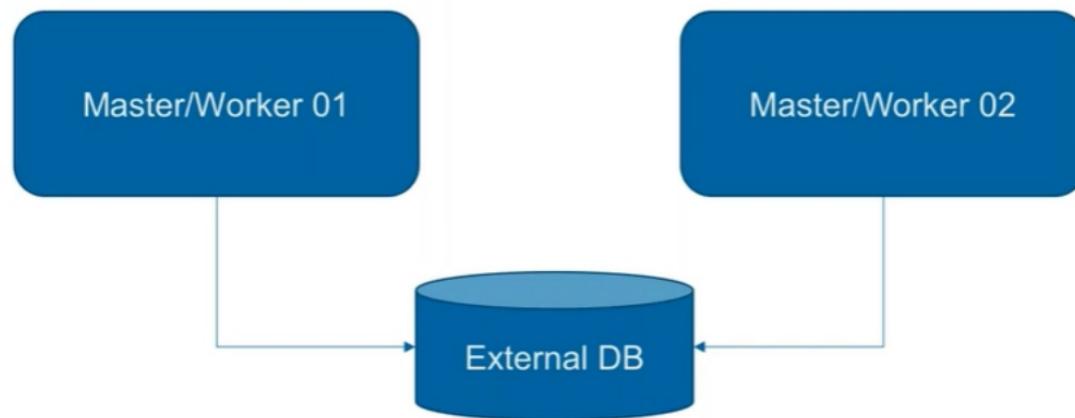
K3S

# K3s HA Requirements

- Unique Hostnames
  - --node-name
  - \$K3S\_NODE\_NAME
- Linux (tested on)
  - Ubuntu 16.04 (amd64)
  - Ubuntu 18.04 (amd64)
  - Raspbian Buster (armhf)

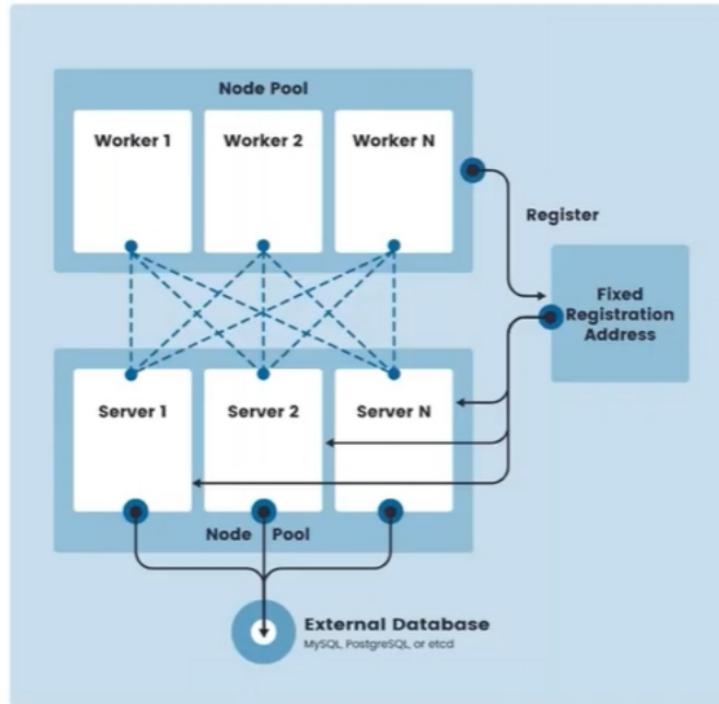
# K3s HA - 2 Nodes (minimum)

All nodes have data plane, control plane and worker role



# K3s HA – Separate Masters

Master nodes have data plane and control plane. Workers are independent.



# HA Demo

# K3s HA – Master

Setup master without agent

## Server

```
curl -sfL https://get.k3s.io | \
  INSTALL_K3S_EXEC=" \
    --write-kubeconfig-mode 644 \
    --datastore-endpoint mysql://k3s-admin:k3s-admin-pw@tcp(mak3r:3306)/k3sdb -t agent-secret \
    --tls-san mak3r.lan \
    --node-taint k3s-controlplane=true:NoExecute" \
  INSTALL_K3S_VERSION="v1.0.0"
sh -
```

# K3s HA – Agent

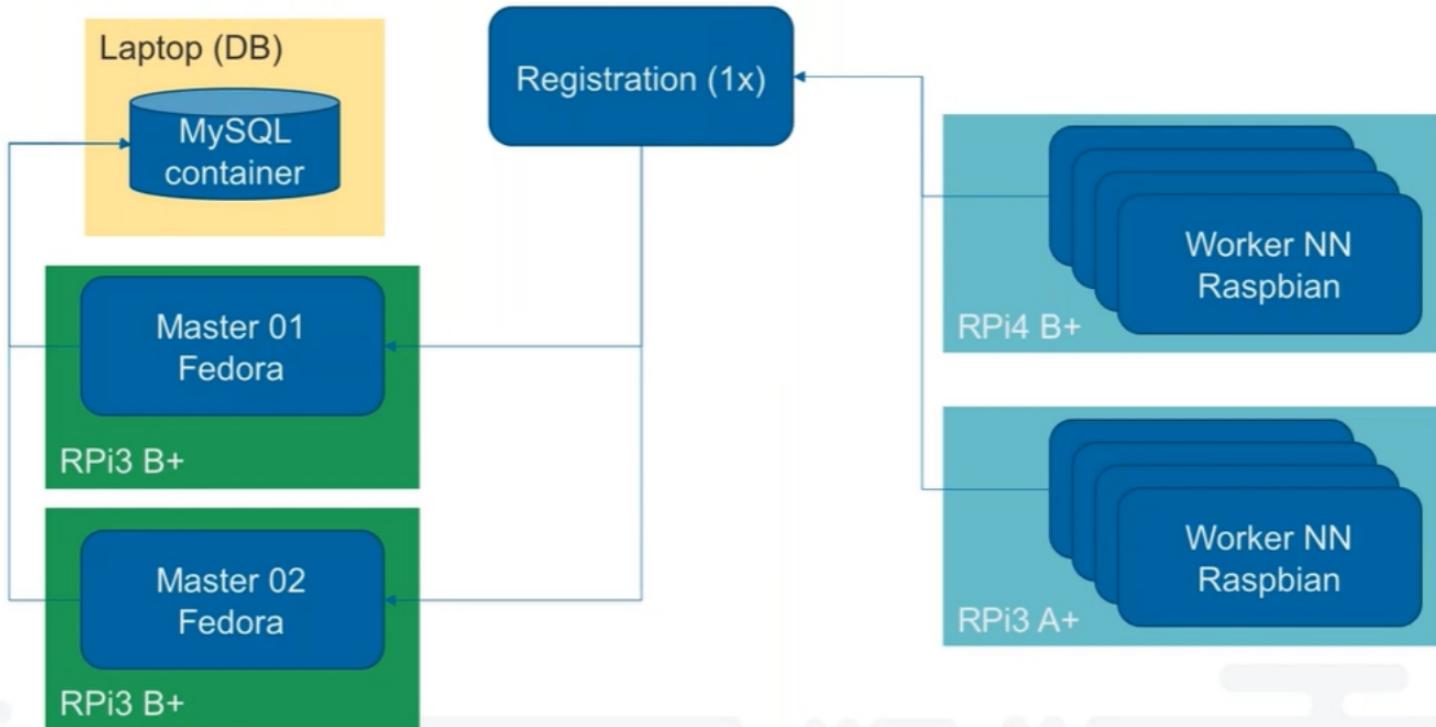
Connect an agent

## Agent

```
curl -sfL https://get.k3s.io | \
  INSTALL_K3S_EXEC="\
    agent \
    -t agent-secret \
    --server https://mak3r.lan:6443" \
  INSTALL_K3S_VERSION="v1.0.0" \
  sh -
```

# K3s HA – Separate Masters

2 nodes have data plane and control plane. Workers are separate.



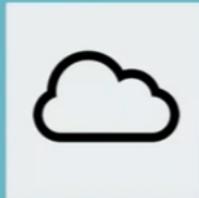
# K3s Use Cases



Edge Devices  
& Arm



CI/CD



Cloud &  
Data Center



Developer  
Desktop

# K3s Use Cases



- Edge Gateway
  - SDN compositions
  - ML before cloud
  - Edge protocol translation
- Branch Management Server
  - Turnkey operations
  - Telemetry
  - Introduce HA operations
- Field Operation Datacenters
  - Mobile AI units (military)
  - Energy remote operations
  - Shipping

# K3s Use Cases



## ○ CI Pipelines

- Automate environment up/down
- Integration testing environments
- Load testing
- Scale testing

# K3s Use Cases

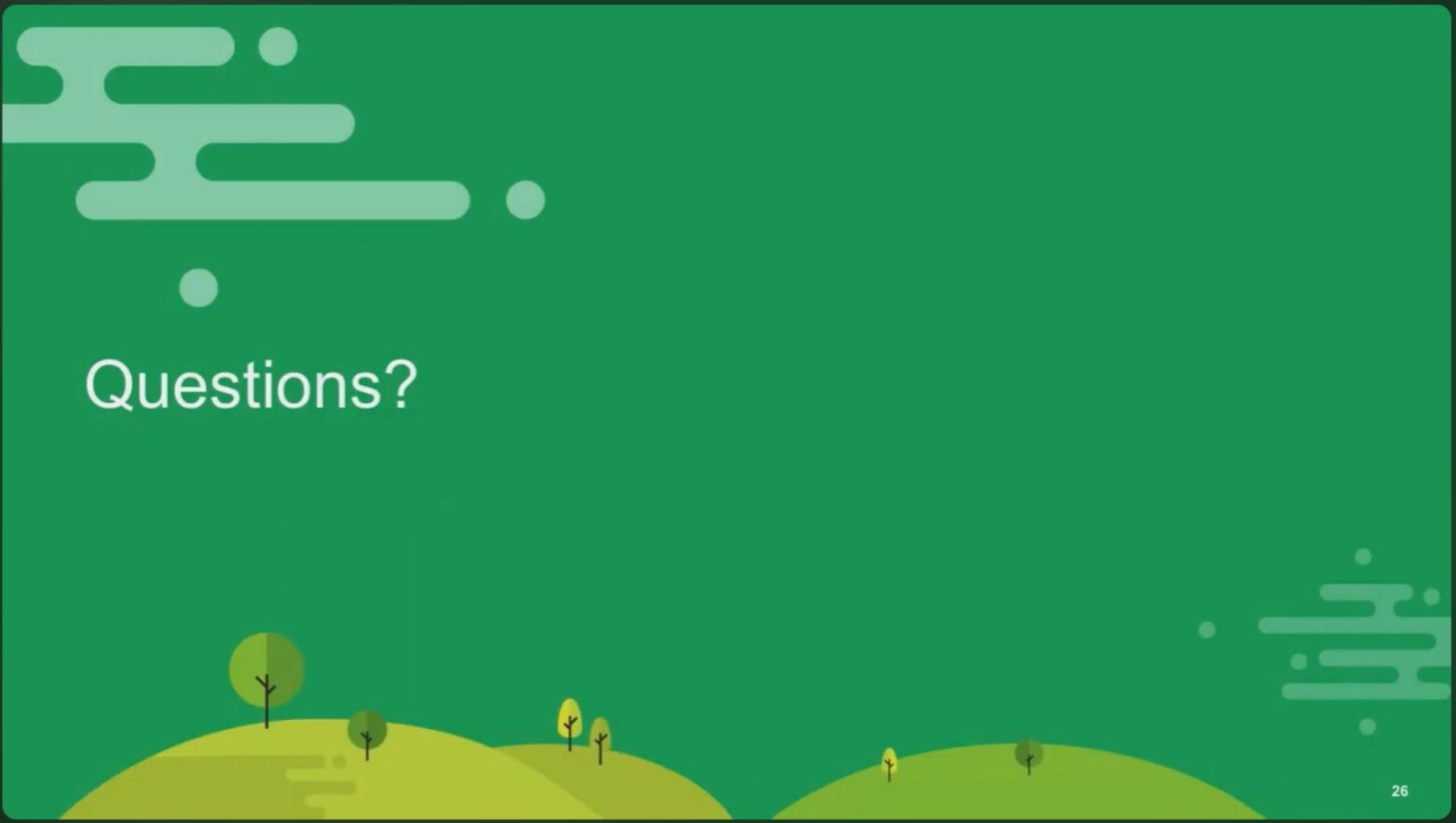


- Simplified Installation of K8s
- Simplified Management
- RDB Solutions are Well Understood
  - Encryption at rest
  - DBA knows RDB
- Many small clusters

# K3s Use Cases



- True K8s Orchestration
- Easy to Up/Down
- RBAC
- CRD
- Helm Chart



# Questions?