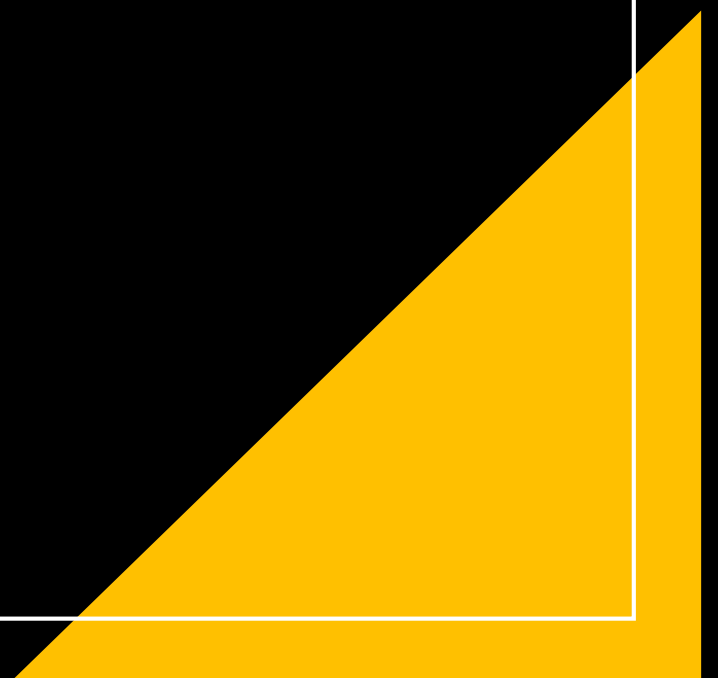


K3s

op Raspberry Pi



Who am I?

Nico Oosterwijk

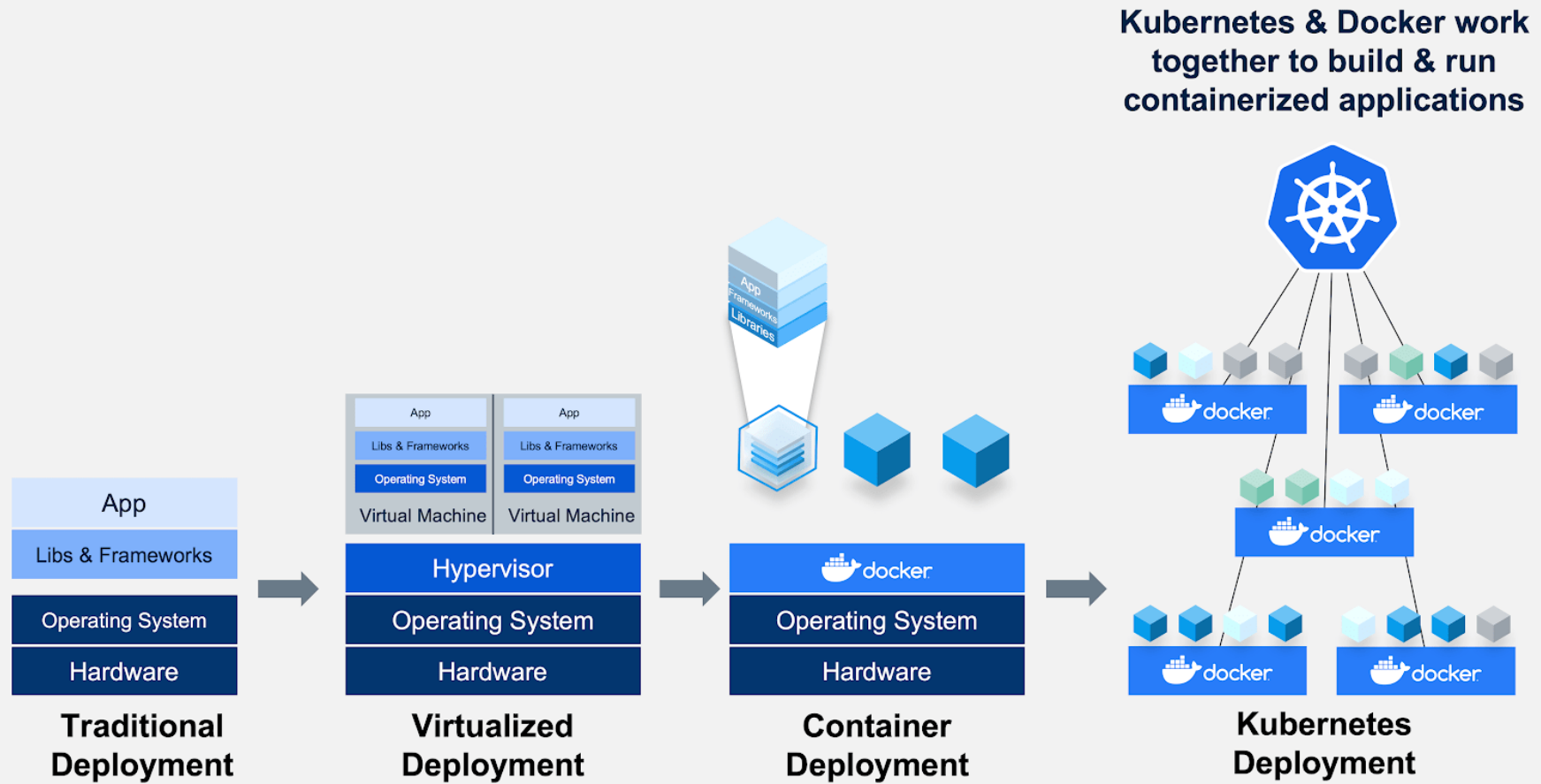
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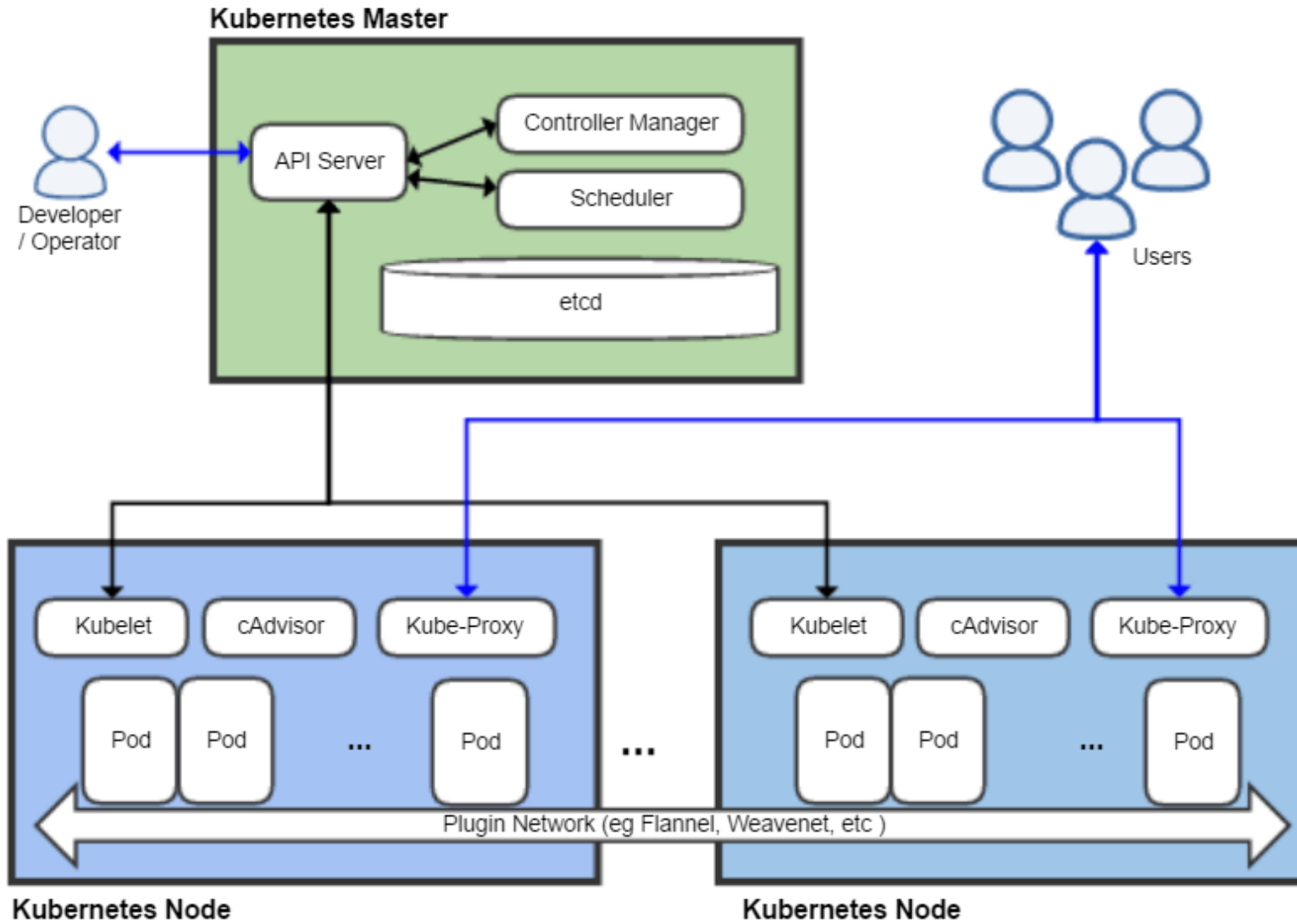


Evolution



Kubernetes (aka K8s)

- Beheer en uitrol van container clusters
- Beheer en uitrol van containerized applicaties
- Samengevat: een open-source Orchestrator
- Maintained by:
- **Cloud Native Computing Foundation (CNCF)**

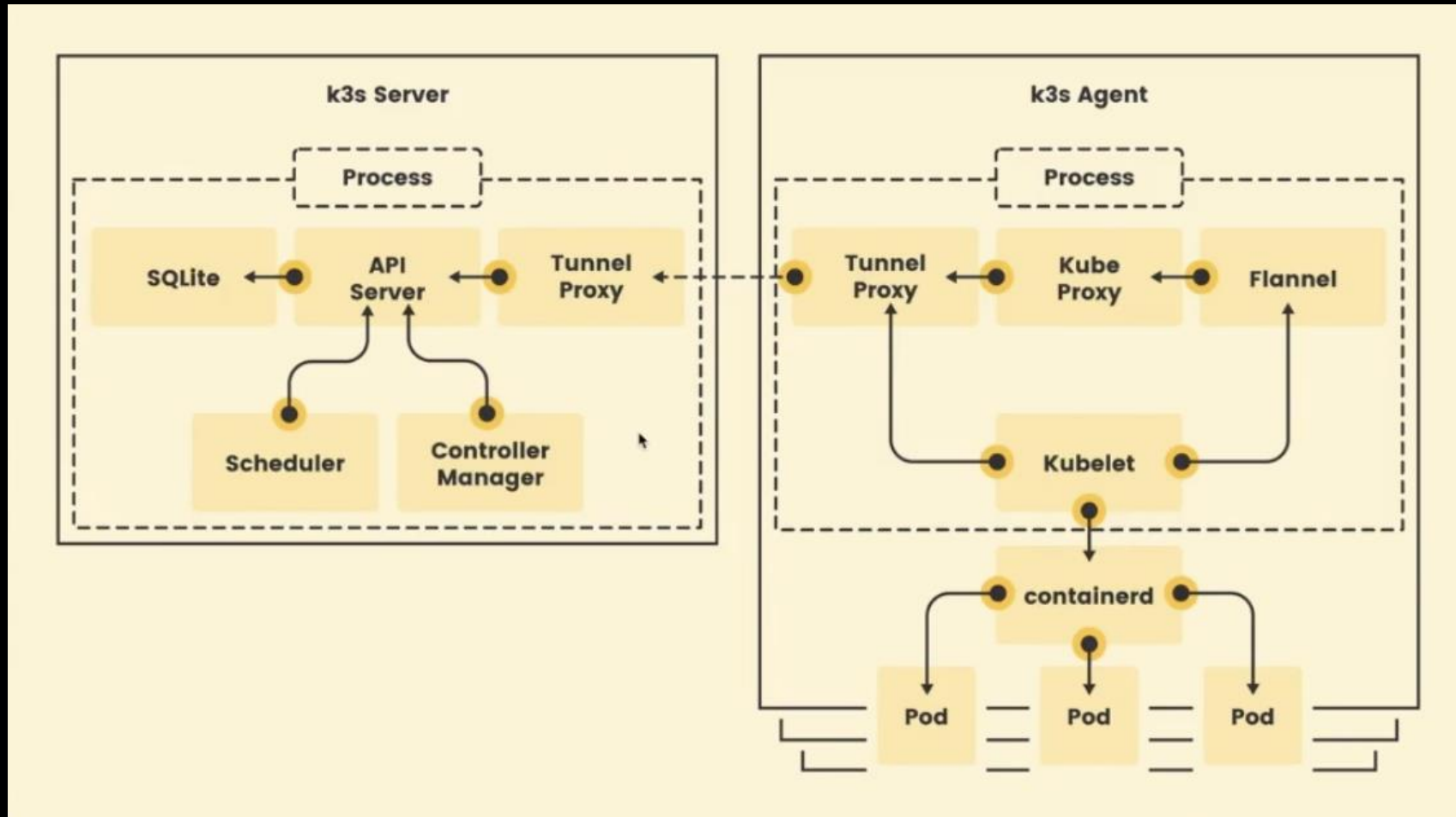


Kubernetes K3s

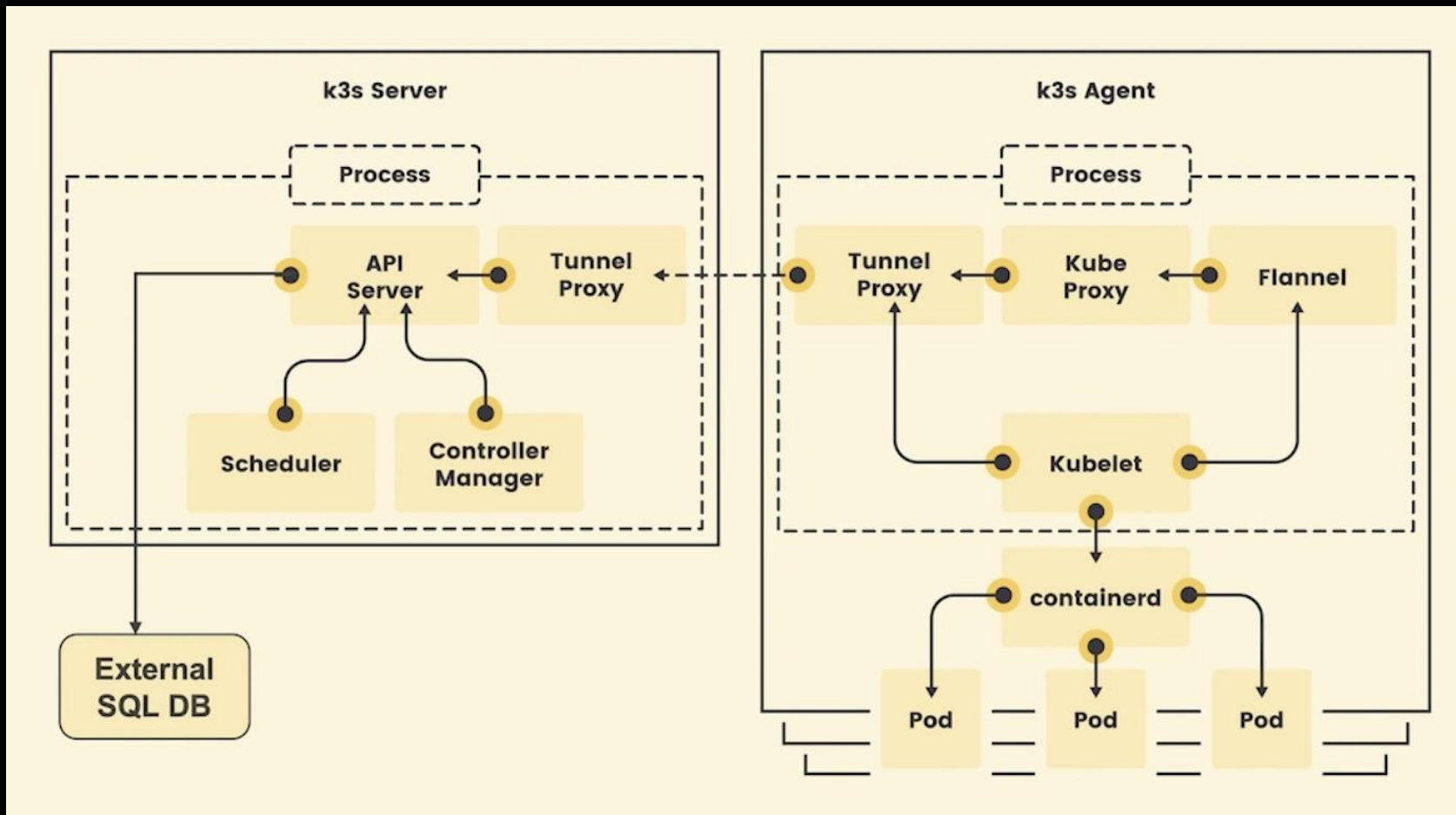
- Lightweight Kubernetes
 - minimal footprint
 - < 50Mb
 - includes proxy, LB, storage
- Particularly suitable for IoT / RPi



K3s architecture



K3s architecture



Pre-requisites

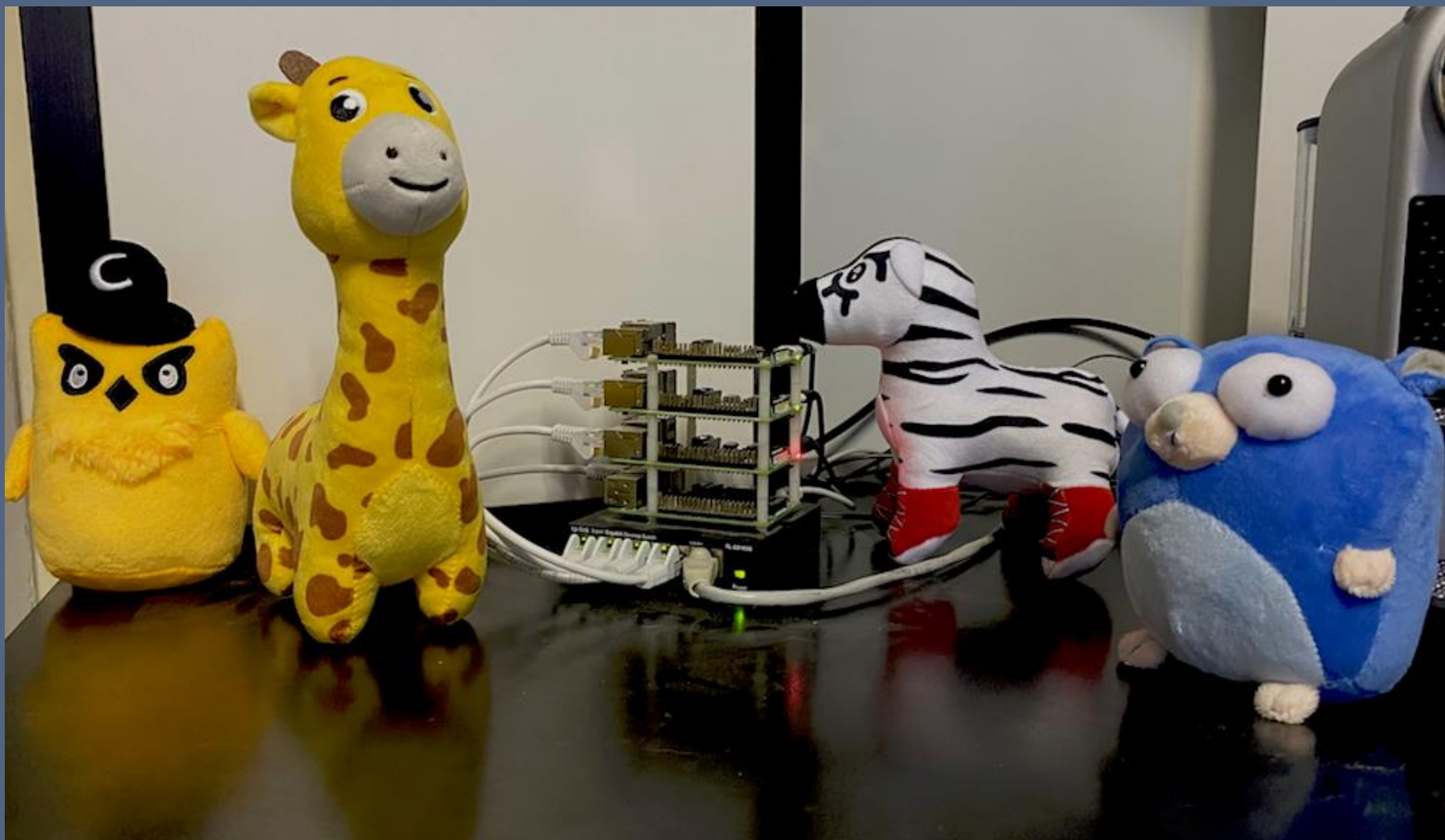
Hardware

- 3x Raspberry Pi 4
- USB power supply hub
- Gigabit Ethernet switch

Operating system

- Ubuntu 20.04.3 LTS (Focal Fossa) – 64bit ARMv8
- SSH access

K3s HA cluster – Raspberry Pi 4



Installation K3s

Preperation

To use system, change cmdline.txt to include cgroup memory:

- `cgroup_enable=memory cgroup_memory=1`

On Debian OS, make sure to use iptables (not nftables)

- `sudo update-alternatives --set iptables /usr/sbin/iptables-legacy`

Set hostname to unique

- `hostnamectl set-hostname [hostname]`

Set timezone

- `timedatectl set-timezone Europe/Amsterdam`

Installation K3s – Single Node

- **via systemd:**

```
$ sudo -i  
# curl -sfL https://get.k3s.io | sh -  
  
# k3s kubectl get nodes  
# k3s kubectl get pods -A
```

Installation K3s – Multiple Nodes

1st node: (master)

```
sudo -i
curl -sfL https://get.k3s.io | sh -
Kubeconfig is written to /etc/rancher/k3s/k3s.yaml
k3s kubectl get nodes
cat /var/lib/rancher/k3s/server/node-token
```

Additional nodes: (workers)

```
K3S_URL="https://<IP ADDRESS MASTER NODE>:6443"
K3S_TOKEN="<NODE-TOKEN>"

sudo curl -sfL https://get.k3s.io | K3S_TOKEN=${K3S_TOKEN} K3S_URL=${K3S_URL} sh -
```

Installation K3s - HA

- **All nodes are Control-Plane, ETCD, Worker**

- **1st node:**

```
curl -sfL https://get.k3s.io | INSTALL_K3S_EXEC="--write-kubeconfig-mode 644 server --cluster-init" sh -s -  
k3s check-config  
sudo cat /var/lib/rancher/k3s/server/token
```

- **Additional nodes:**

```
K3S_URL="https://<IP ADDRESS 1st NODE>:6443"  
K3S_TOKEN="<JOIN-TOKEN>"  
curl -sfL https://get.k3s.io | sh -s - server --token=${K3S_TOKEN} --server=${K3S_URL}  
k3s check-config
```

Installation K3s – air-gapped node

- **Copy the following files to the nodes:**

- **k3s-airgap-images-arm64.tar (from <https://github.com/k3s-io/k3s/releases>)**
- **k3s-arm64 (from <https://github.com/k3s-io/k3s/releases>)**
- **install.sh (from <https://get.k3s.io>)**

- `sudo mkdir -p /var/lib/rancher/k3s/agent/images/`
- `sudo cp ./k3s-airgap-images-arm64.tar /var/lib/rancher/k3s/agent/images/`
- `sudo chmod +x k3s-arm64`
- `sudo cp k3s-arm64 /usr/local/bin/k3s`

- `curl -o install.sh https://get.k3s.io`
- `chmod +x install.sh`

Installation K3s – HA on air-gapped nodes

- **1st node:**

```
INSTALL_K3S_SKIP_DOWNLOAD=true \  
INSTALL_K3S_EXEC="--write-kubeconfig-mode 644 server --cluster-init" \  
./install.sh
```

- **Additional nodes:**

```
K3S_URL="https://<IP ADDRESS 1st NODE>:6443"  
K3S_TOKEN="<JOIN-TOKEN>"
```

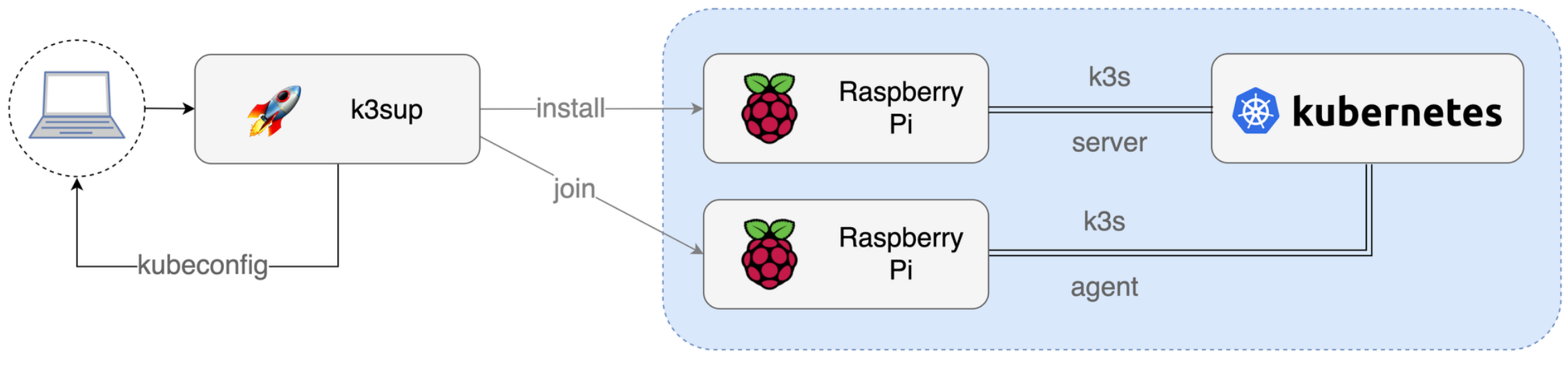
```
INSTALL_K3S_SKIP_DOWNLOAD=true \  
INSTALL_K3S_EXEC="--write-kubeconfig-mode 644 server --token ${K3S_TOKEN} --server  
${K3S_URL}" \  
./install.sh
```


Get the KubeConfig

```
sudo cat /etc/rancher/k3s/k3s.yaml  
> ~/.kube/rpi
```

```
export KUBECONFIG=~/.kube/rpi
```

```
kubectl get nodes
```



Installation K3s with K3Sup

```
k3sup install --ip 192.168.178.50 --user ubuntu --cluster
```

```
k3sup join --ip 192.168.178.51 --user ubuntu --server-ip 192.168.178.50 --server-user ubuntu --server
```

```
kubectl label node rpi-1 rpi-2 rpi-3 node-role.kubernetes.io/worker=true
```

DEMO



Questions?

