

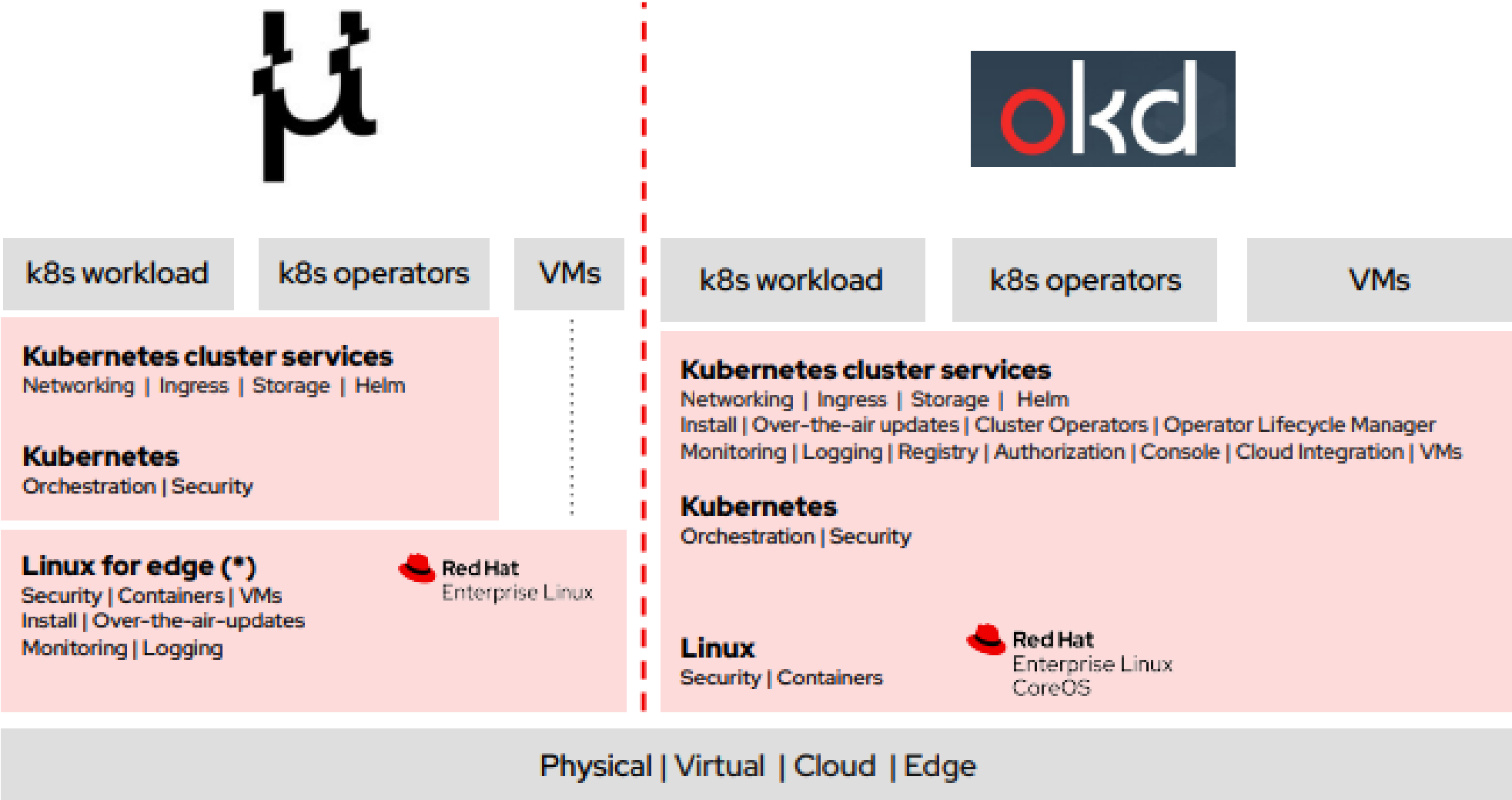
KubeCon 2023 Edge Day EU

Opening Remarks

- 75 % Data generated by Edge IoT devices, 4x bigger than cloud.
- Consideration about energy, performance, security, ML/AI OPs from many aspect.
- Originally most of the data is generated at edge.
- It is all about community, take the effort to meet people!

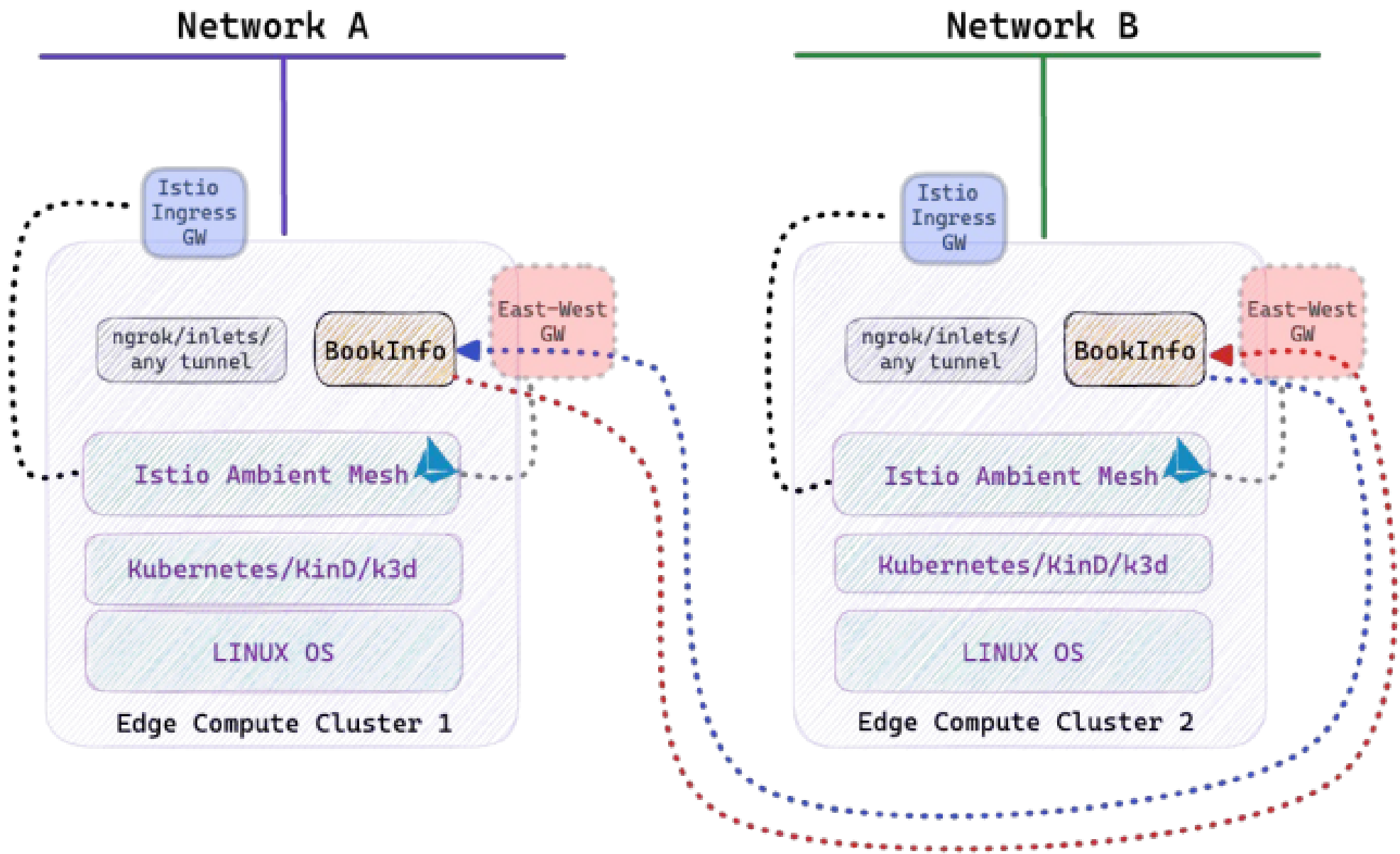
Building a Kubernetes Offering for Small Edge Devices

- The right balance between functionality and hardware footprint.
- Some customers are looking for the solution from cloud-native DevOps.
- MicroShift minimizes the rootfs to fit in the kubernetes.
- Storage needs to be there using CSI, this is actual situation.



How a Service Mesh Enhances EdgeComputeOps

- Network is critical issue for edge IoT devices.
- Edge can be categorized into Near, Far and Micro edges.
- Istio Ambient Mesh Approach Introduction for Edge.



Sharpen Your Edge Three Ways With Kubernetes

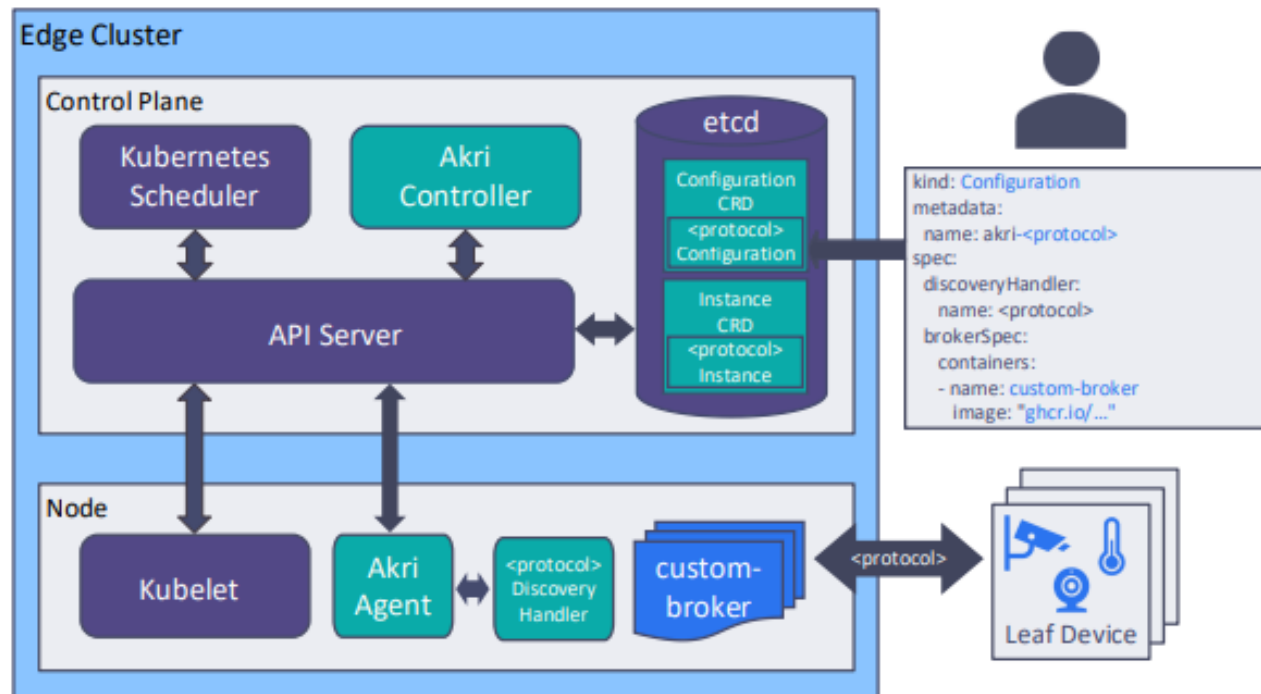
Scale edge efficiently

- Manage edge holistically
- Automate repetitive edge management
- Design edge implementations at scale
- Contain edge costs at scale

Securely Interacting with Edge Devices

Akri: A Kubernetes Resource Interface

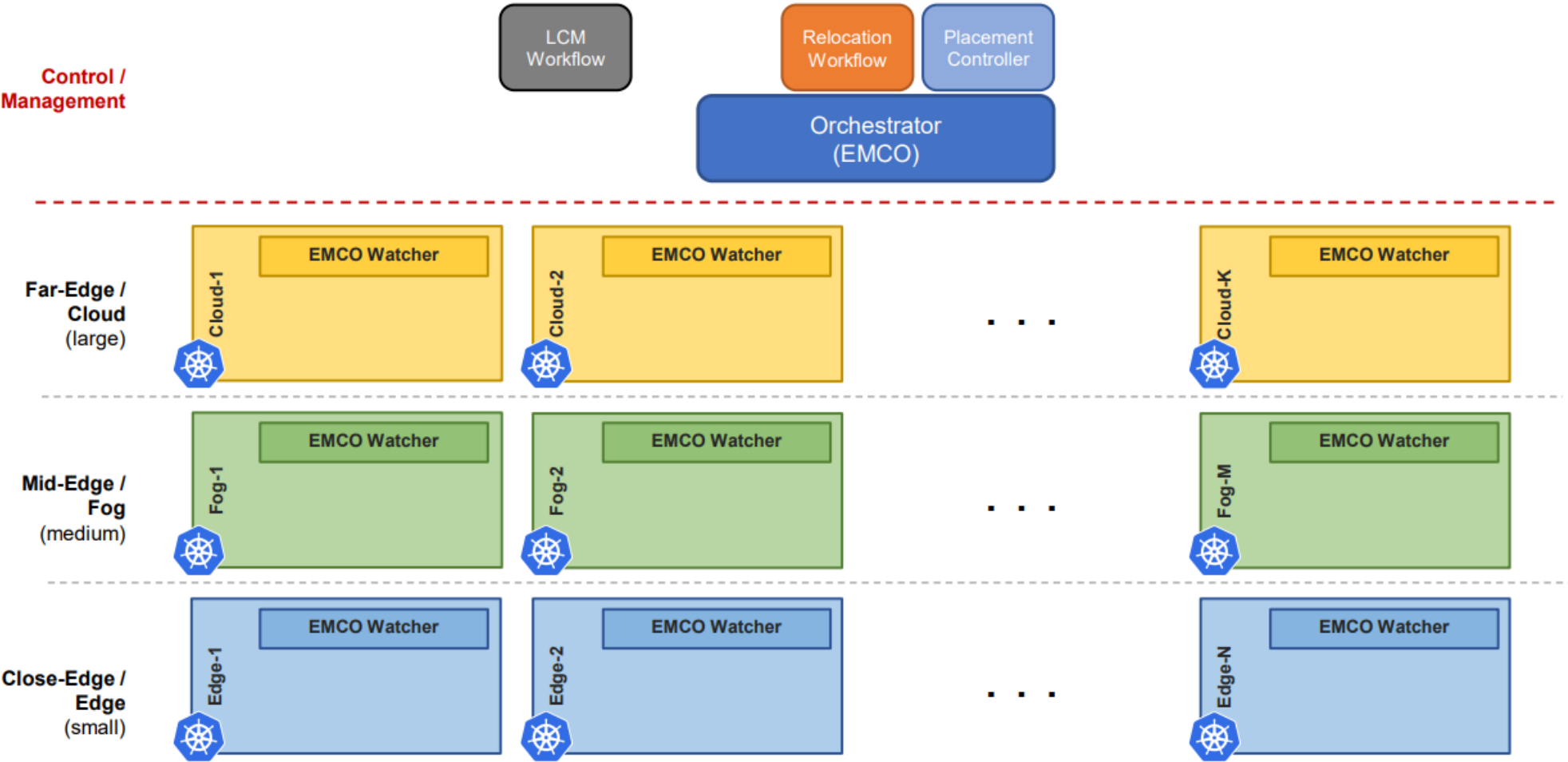
- Makes connections to IoT devices via their protocols (OPC UA, ONVIF, udev, etc.)
- New devices are detected automatically, making scaling up or down very easy
- Devices are registered as Kubernetes resources, just like memory or CPUs
- Workloads can be assigned to specific devices or group of devices, even if attached to other nodes



- **Akri Configuration:** a custom resource that tells Akri what kind of device to look for
- **Discovery handlers** look for the device and inform Agent of discovered devices
- **Akri Agent:** handles resource availability changes and enables resource sharing
- **Akri Instance:** another custom resource created by the Akri Agent to track availability and usage of device
- **Akri Controller** sees each Akri Instance and deploys a “broker” pod that connects to the resource and utilizes it

Smart Workload Migration Across Multiple Clusters

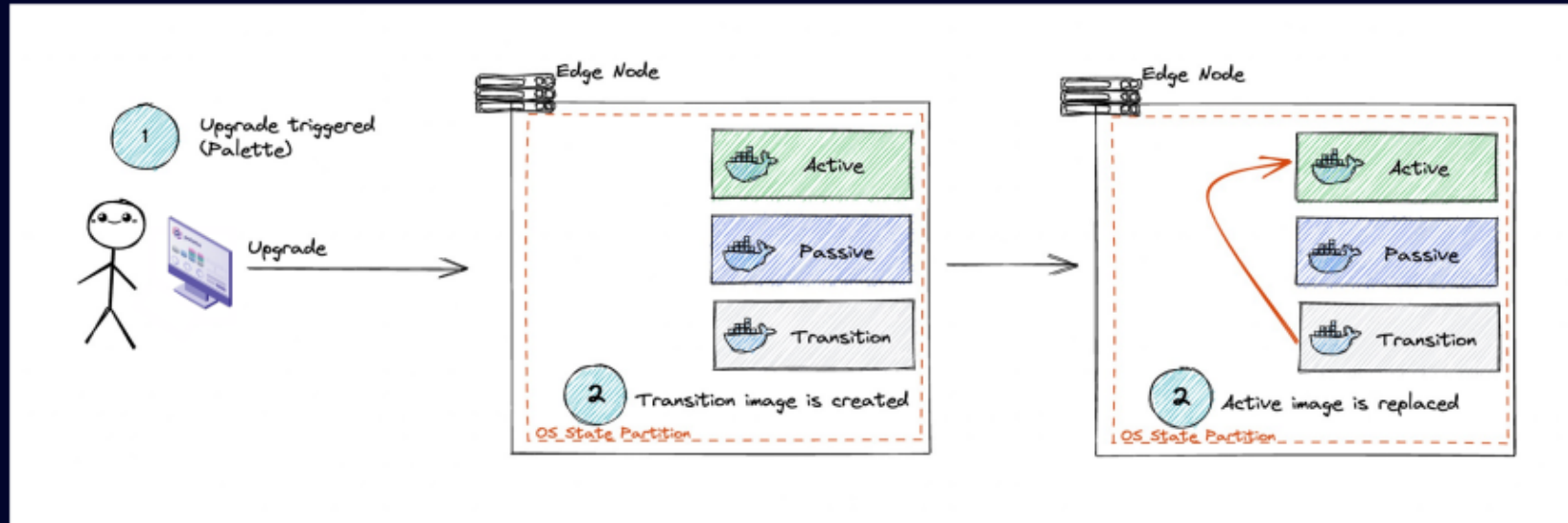
- very high speed, low latency, and massive connectivity.
- unmanned aerial vehicles, autonomous vehicles, ehealth, and video streaming, have mobility needs.
- identify a functional gap in the Edge systems, to relocate Edge applications between Edge Hosts.






Fruit-Picking Robots Powered by K8s

- Use case for Robotics and Robot application
- It's complex to manage multiple hosts installations at scale
- Gathering status for all assets was still too manual
- Operating multiple platforms is hard
- Extra security needs to be considered — OS compliance and manual encryption

Zero-Risk remote upgrades



-  OTA Upgrades with A/B Partitioning
-  Incremental patching via transactional Upgrades
-  Atomic upgrades reduce infrastructure drift

Consideration/Ideas

- Zero-Down time upgrade on edge
 - having the pre-initialize the container while current on is still running except hardware bindings, then if pre-initialization completes it can switch into the new one.
 - the problem is we cannot be sure if it guarantees it does not break the application until we run... but this could reduce the upgrading time significantly.

Consideration/Ideas

- Location awareness
 - Is this something application should manage? if the system(k8s) manages the deployment based on the location or any dynamic sensing data, it would be much easier to application perspective.