



Advanced Technology Office

28 rue Jean Rostand
91400, Orsay
France

Angelo Corsaro, PhD

Chief Technology Officer
ADLINK Tech. Inc.
angelo.corsaro@adlinktech.com

Gabriele Baldoni

Technologist
ADLINK Tech. Inc.
gabriele.baldoni@adlinktech.com

fog Ø5

The
Fog Computing
Platform

Context

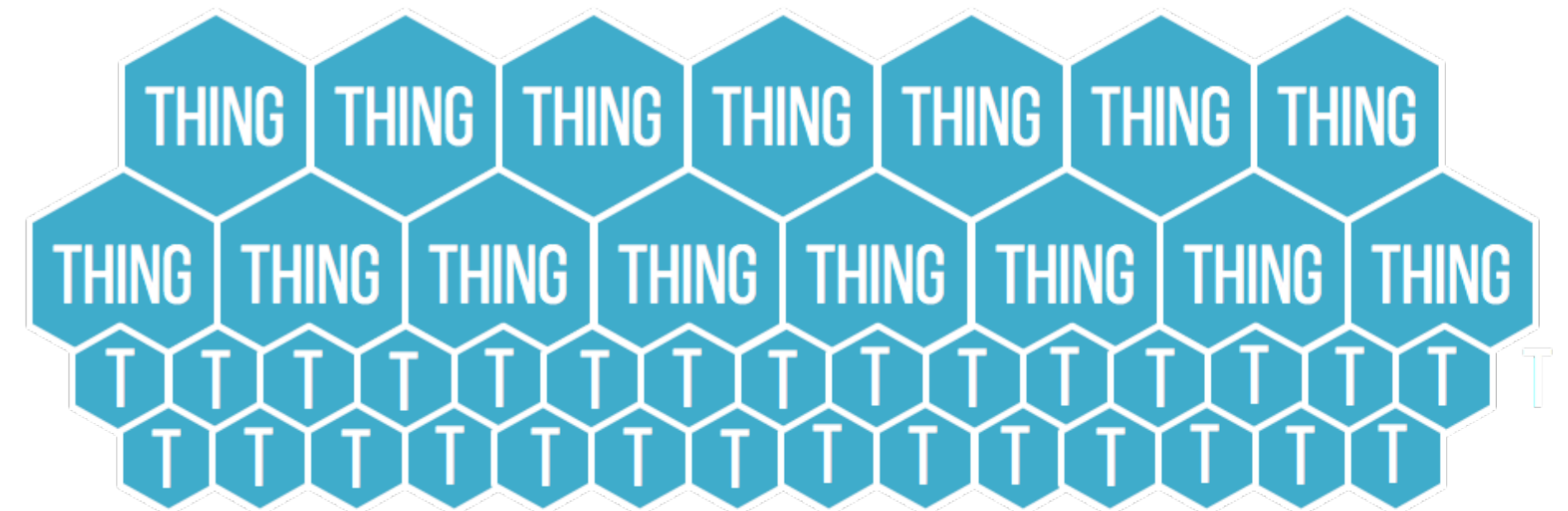
Hardware Tiers in IoT

A generic IoT/IIoT system has **three** different **hardware tiers**

Off-premises data-centre which may be private or public

On-premises edge infrastructure

Things with computational, communication and storage capacity



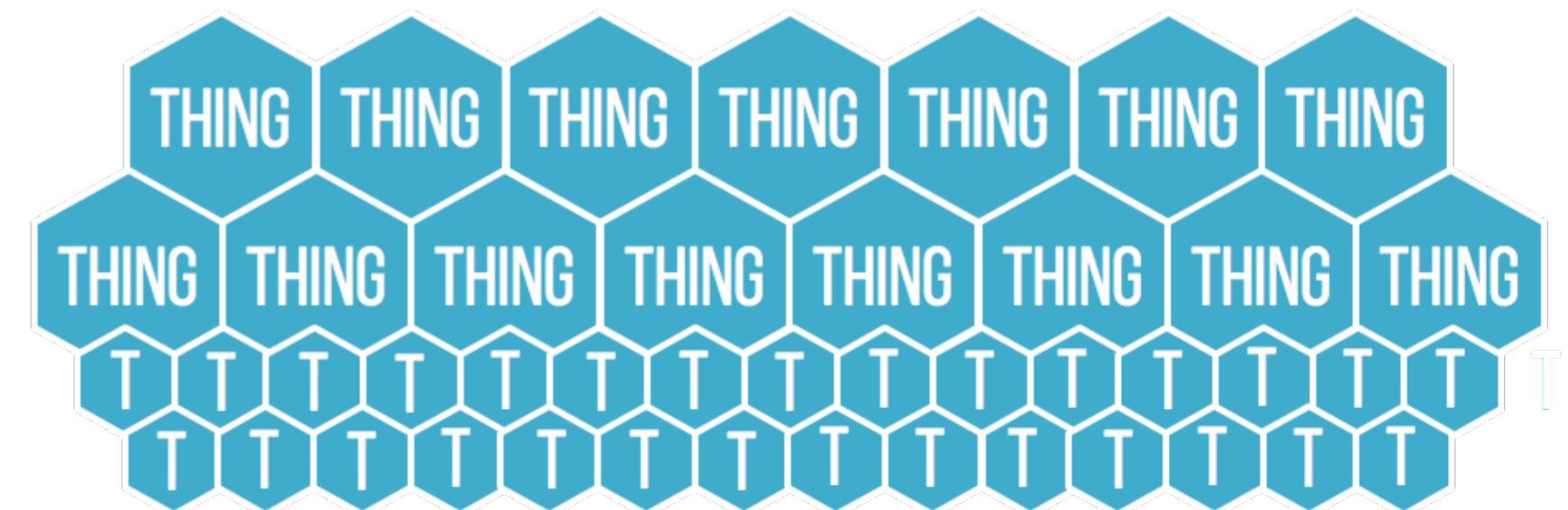
Cloud Centric Perspective

The early days of IoT/IIoT have been biased by a **cloud centric perspective**



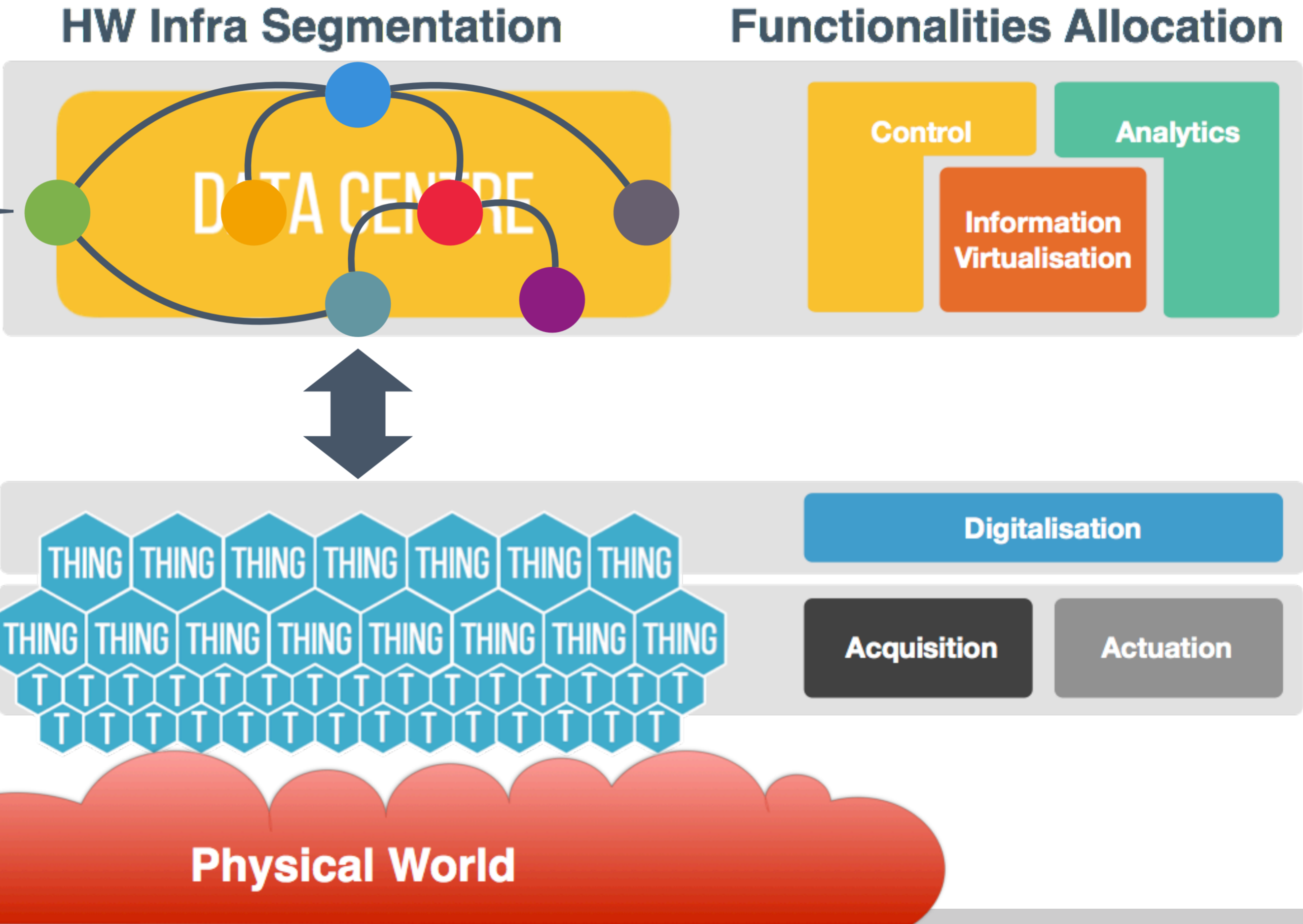
The cloud infrastructure is **mature** and **operationally convenient...**

Yet **cloud centric architectures don't fit well** for a **large class** of **IoT/IIoT applications**



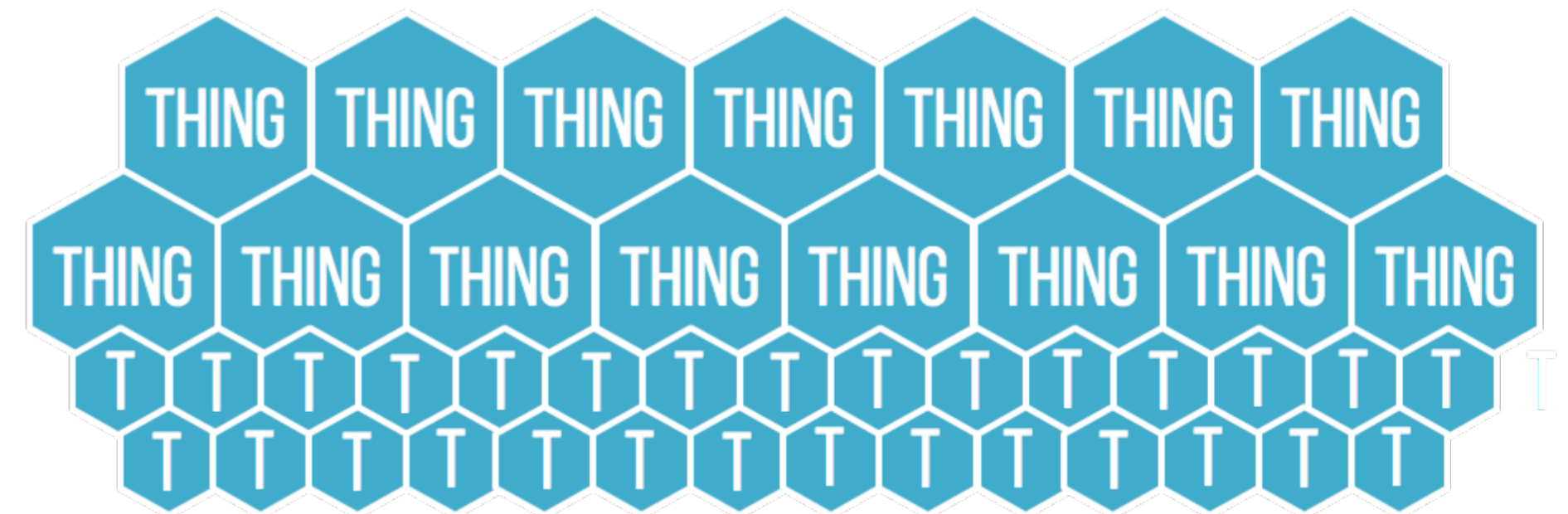
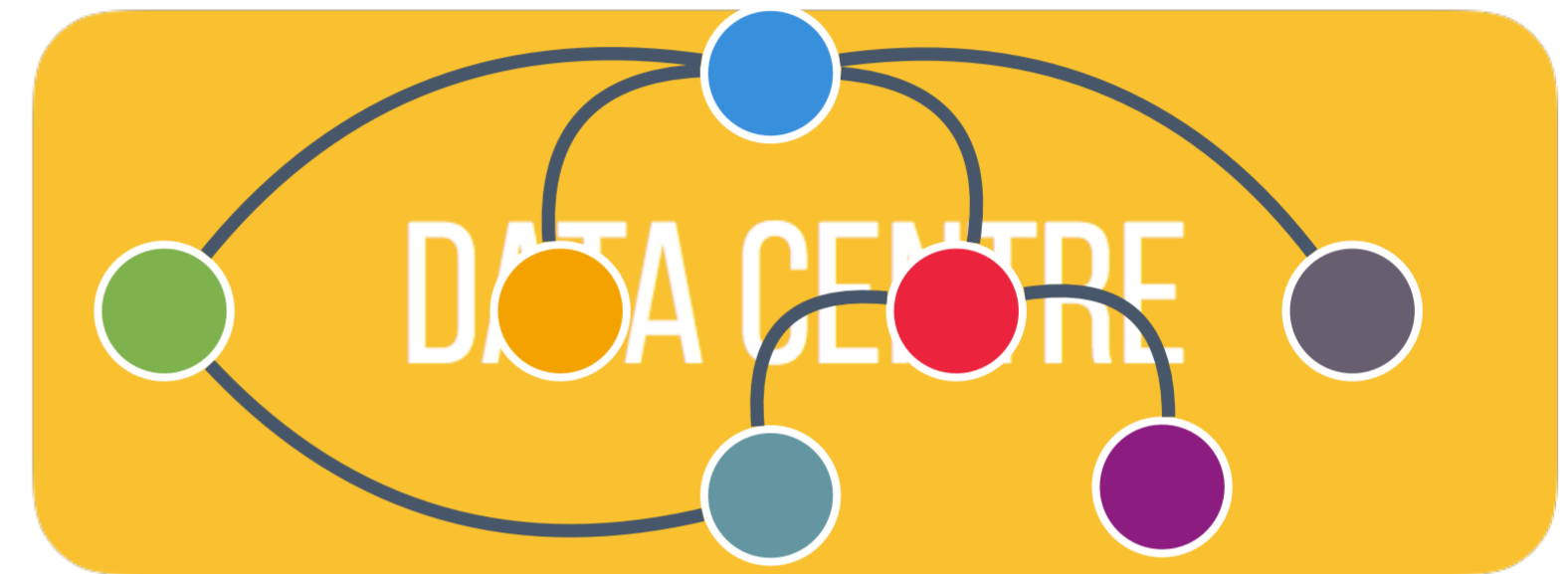
Cloud Centric Perspective

The IoT application is deployed, managed and monitored using the Cloud IaaS infrastructure



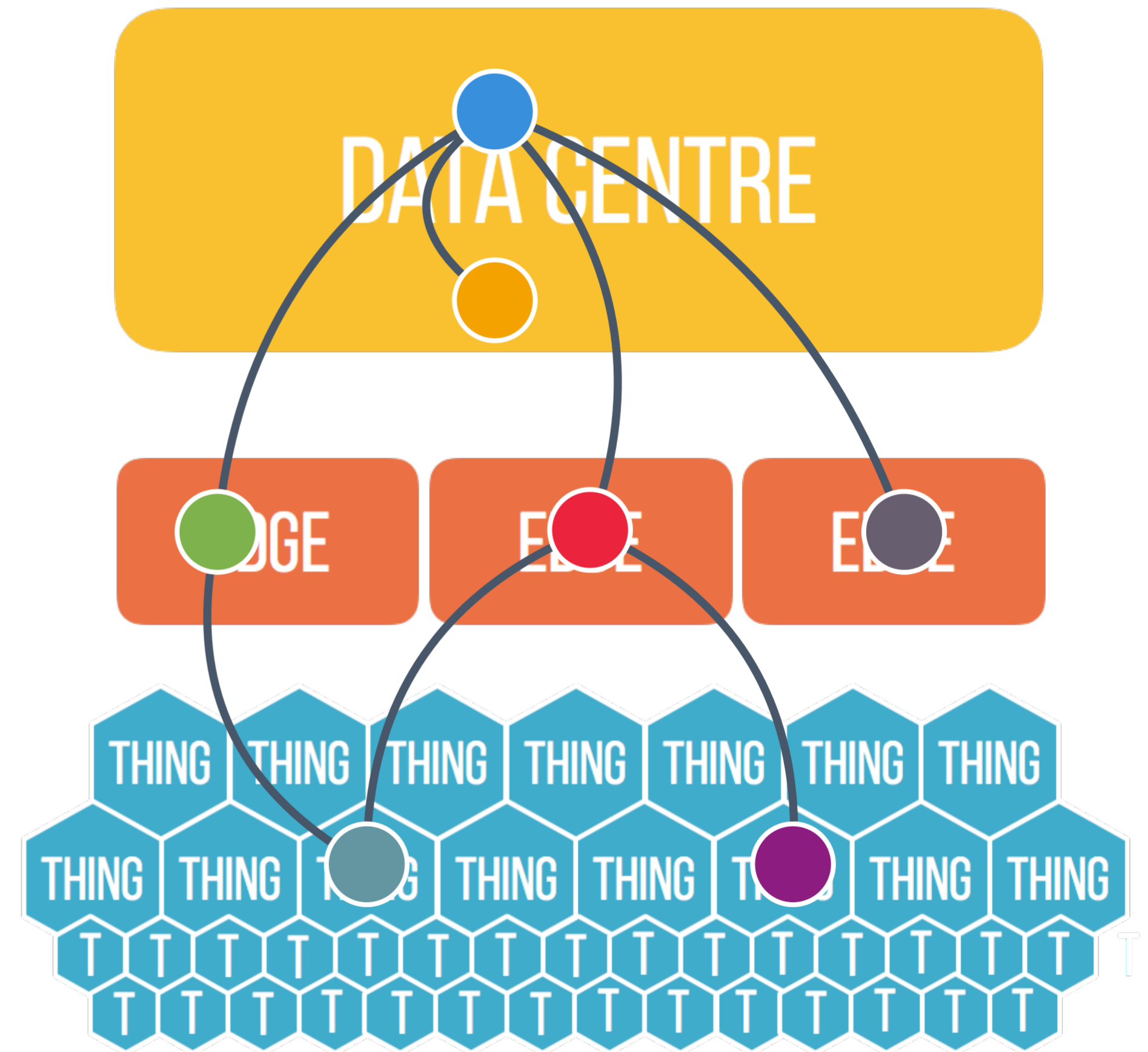
A Different Reality...

Due **latency, throughput, connectivity, cost** and **security** only a **restricted class of IoT/IIoT applications** that are **compatible** with the **cloud-centric mode**



A Different Reality...

The **entities defining** an IoT / MEC **application** need to be **provisioned** and **managed** across the **three tiers**



| fɒg kəm'pjʊ:tɪŋ|

FOG COMPUTING

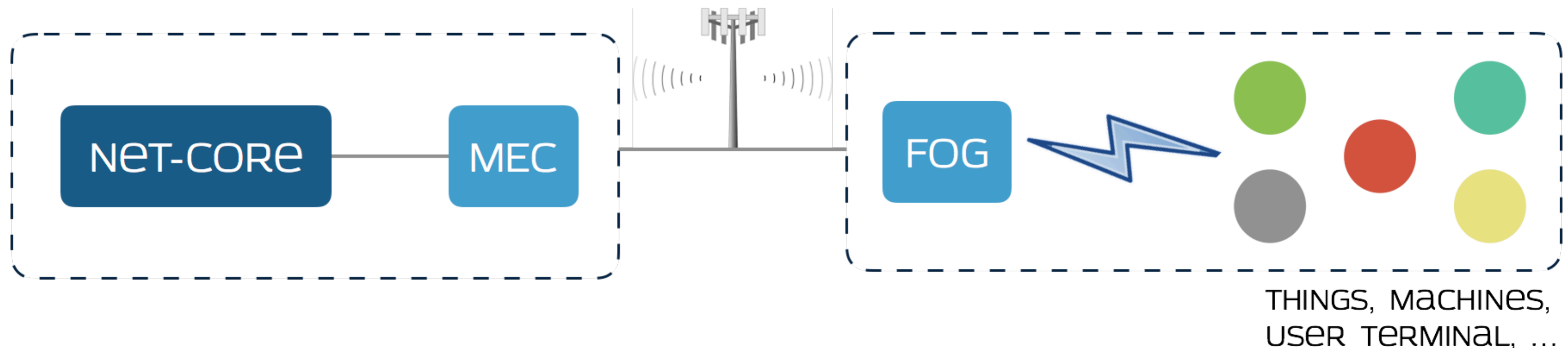
System-level architecture that distributes computing, storage, control and networking functions closer to the users along a cloud-to-thing continuum

Fog and MEC Convergence

The Fog and MEC infrastructure exist within different administrative boundaries

The ability of leveraging Fog, **on premises**, and MEC at the **edge of the network**, will be the ideal situation for demanding IIoT applications

The Challenge however is how to manage resource end-to-end.



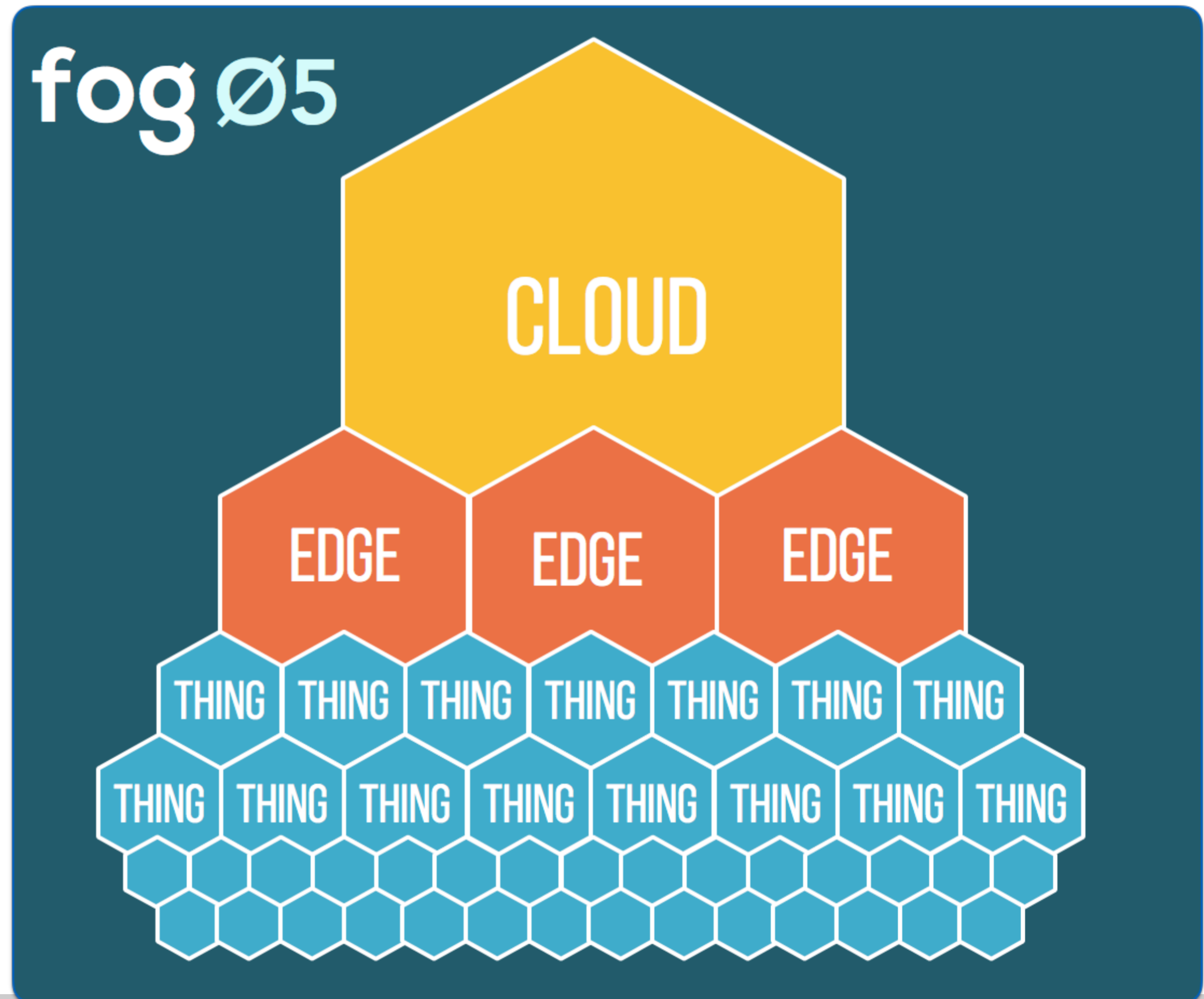
fogg Ø5

Compute Fabric Unification

The **fogØ5** unifies the **compute**, **storage** and **communication** fabric that spans across things, edge and cloud infrastructure

It unifies administration, management and monitoring end-to-end

Designed to unify Fog and MEC

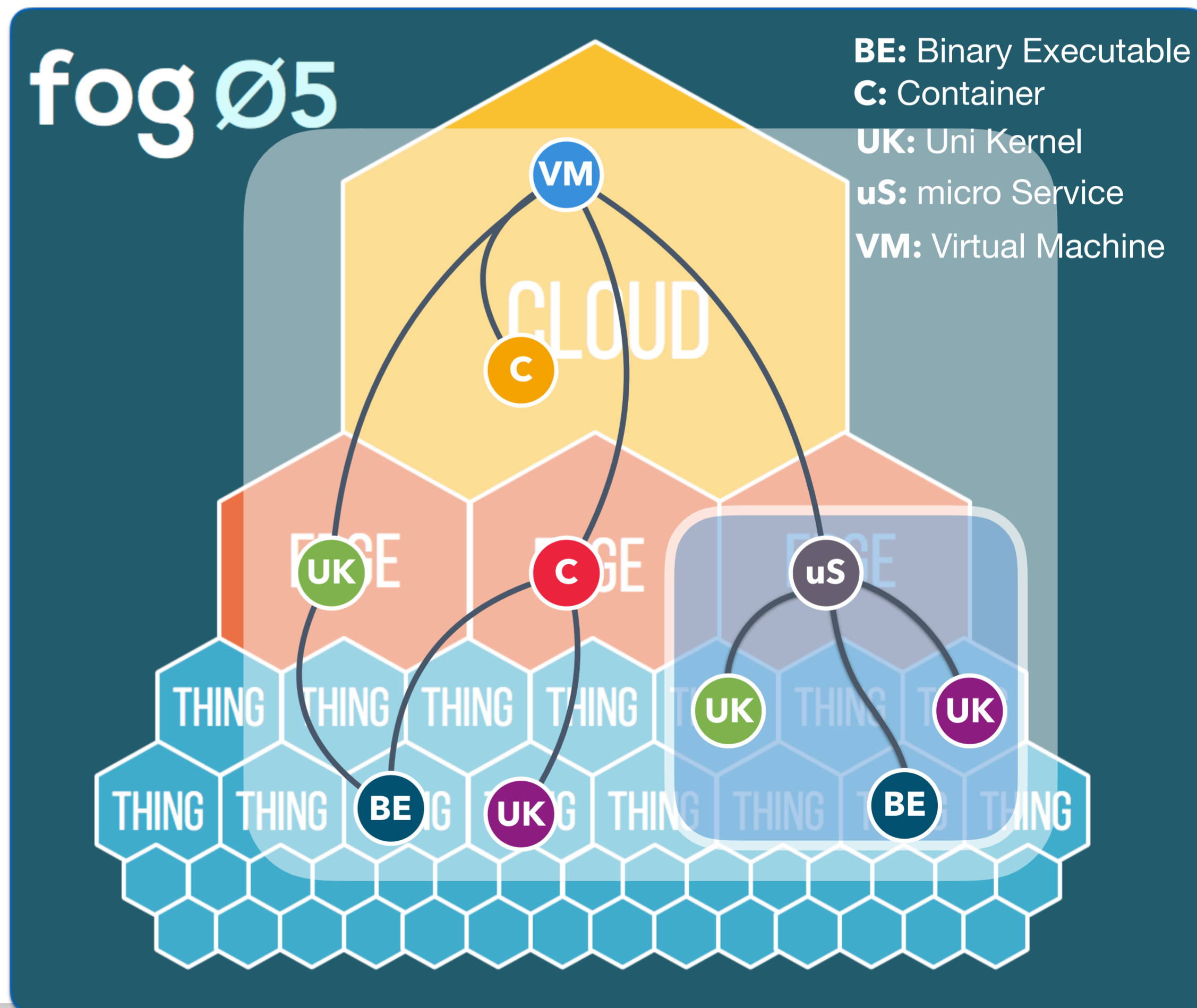


Entity

A **fogØ5** *entity* is an **atomic entity**, such as a Virtual Machine, a container, a UniKernel, a binary executable, or a **directed acyclic graph** (DAG) of entities.

Entities may have **deployment affinity** w.r.t. to each other as well as with respect to **compute, storage, I/O** and accelerators, e.g., FPGA

fogØ5 uses **plug-ins** for dealing with different kinds of entities as well as networks, I/O, etc.

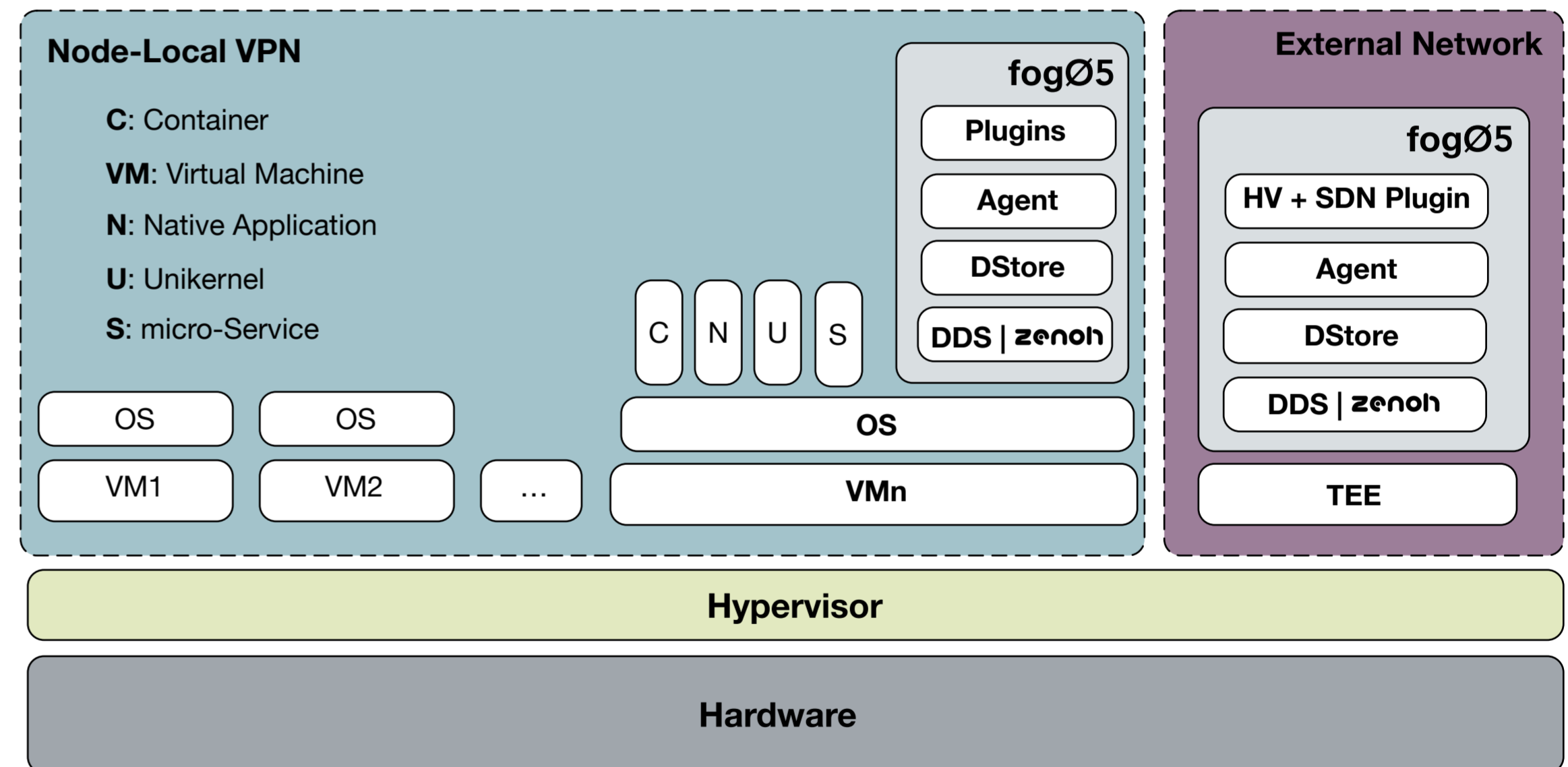


Architecture

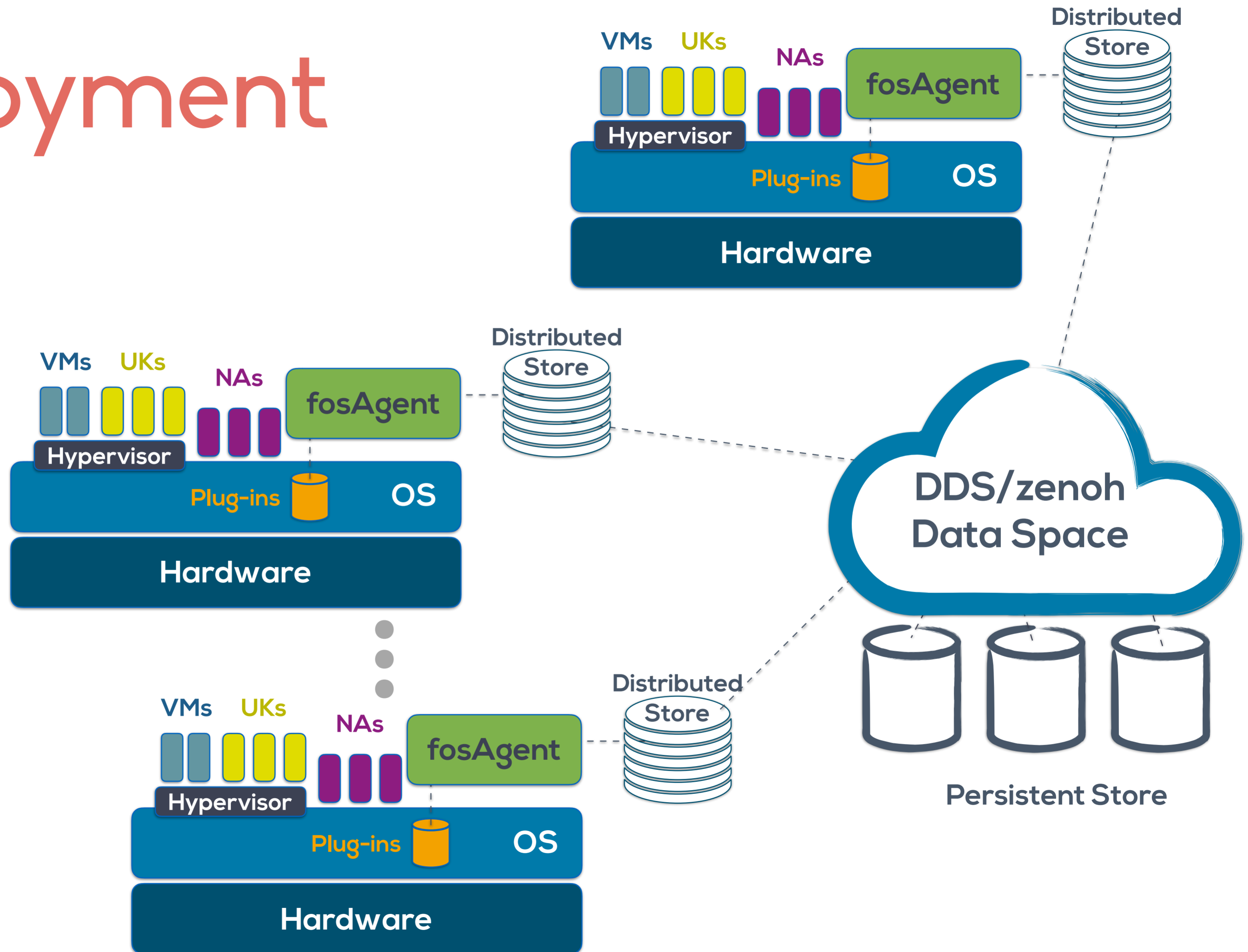
fogØ5 is an infrastructure to provision, manage and monitor networks as well as applications composed by different kinds of deployable bundles, ranging from a micro-service to a full VM

fogØ5 functionalities are provide by plugins for managing entities, networks, I/O etc.

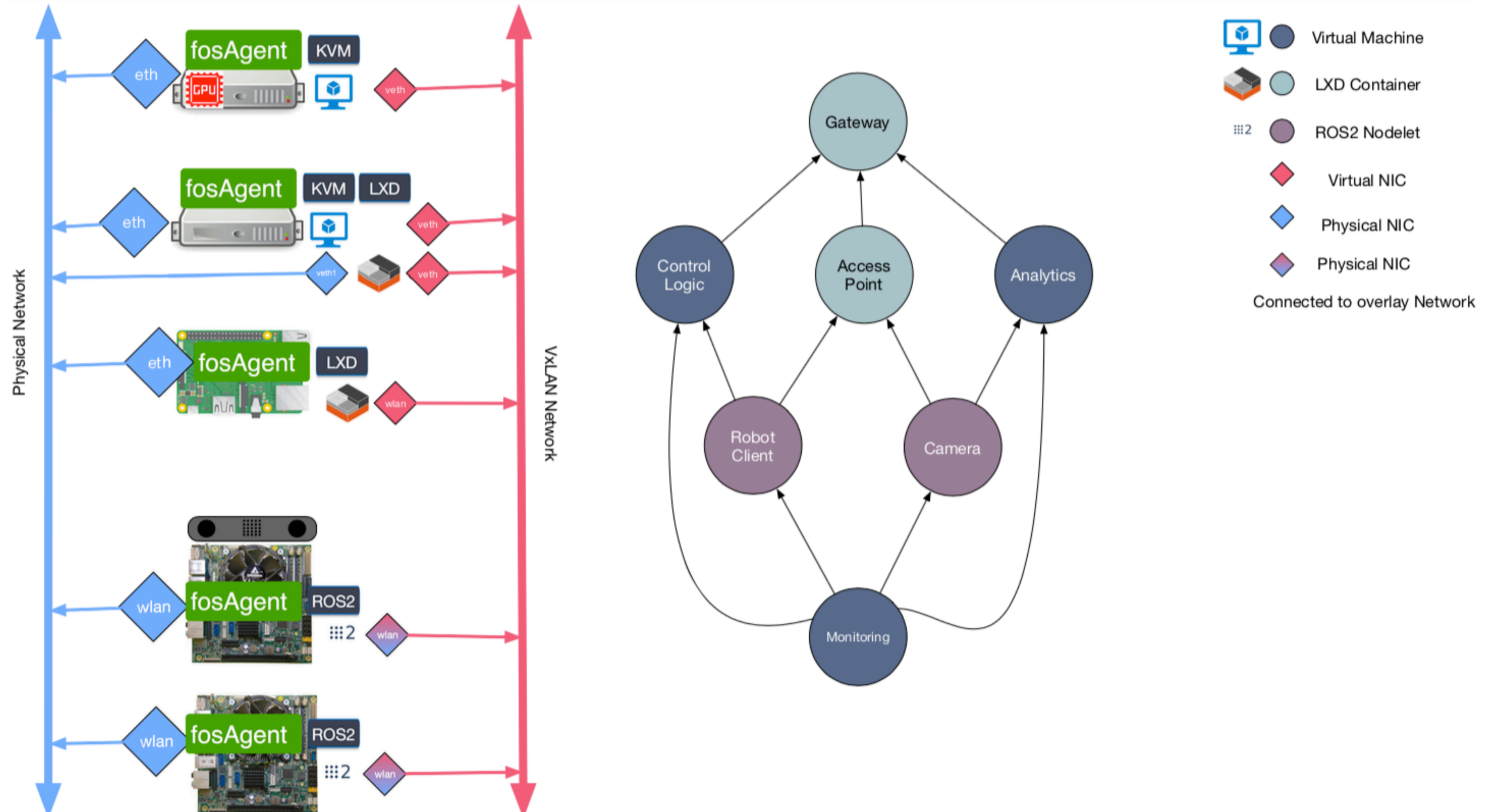
fogØ5 provide a virtualised distributed key-value store



Deployment



Real-World Use Case



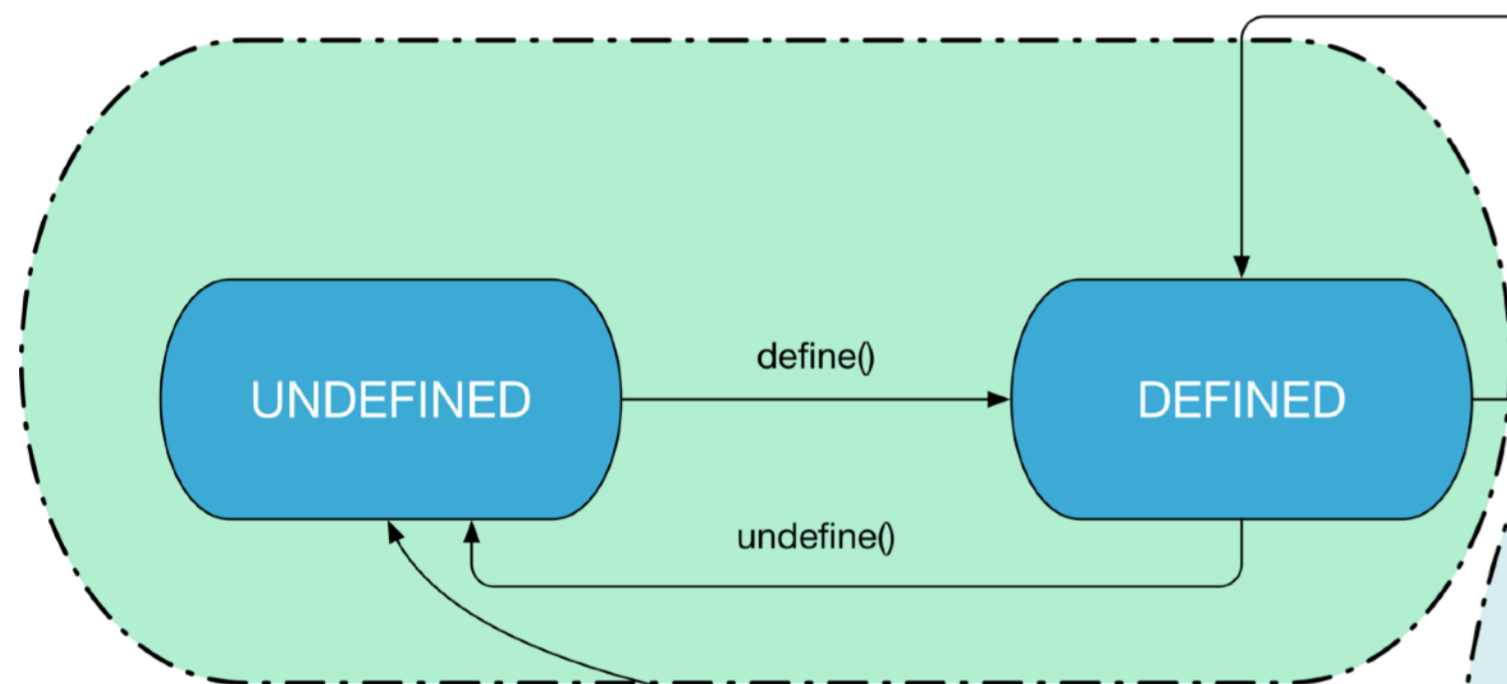
Entity Manifest's

fogØ5 entities are described through JSON manifests.

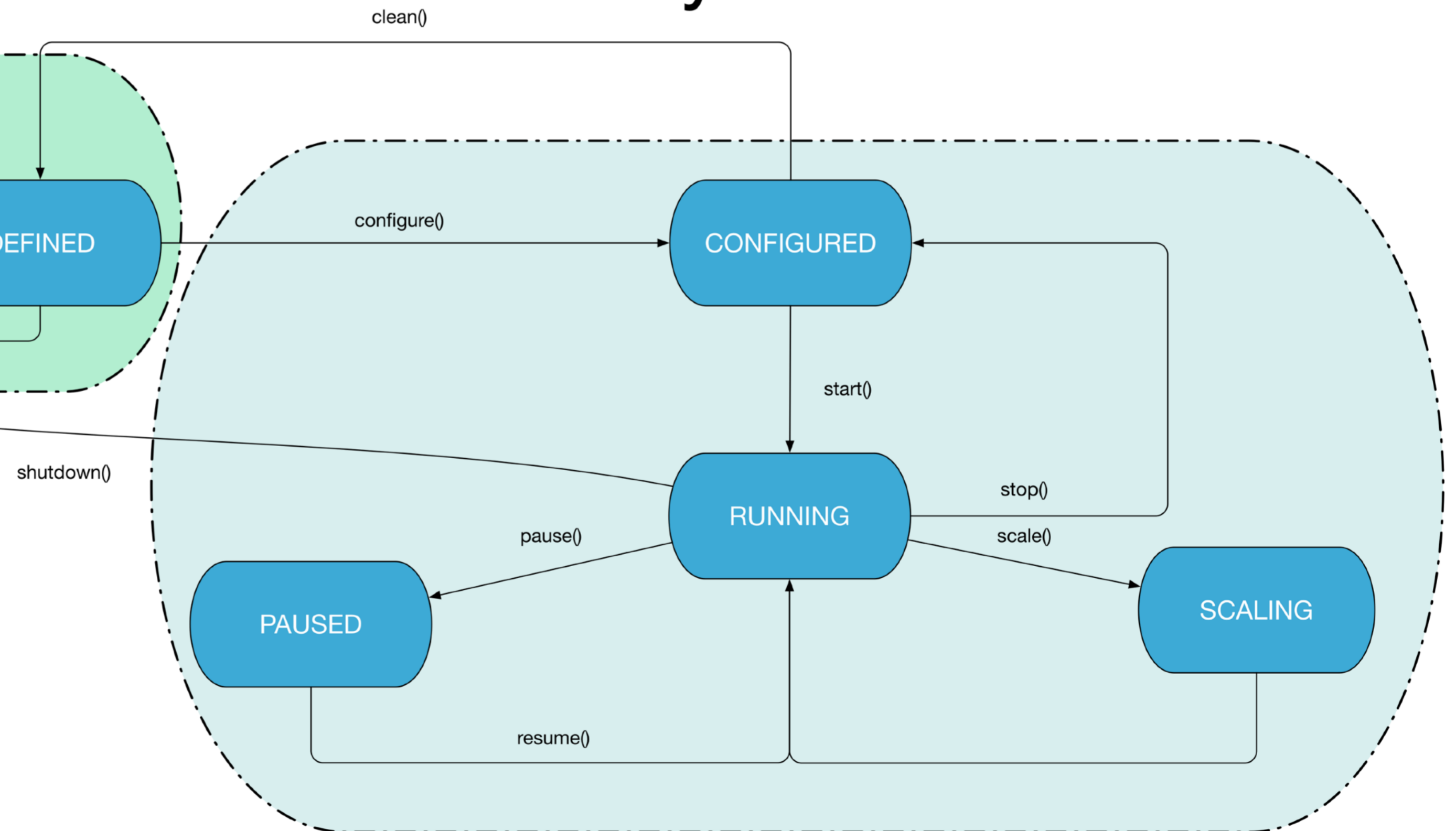
These **manifest** are **compatible** with **ETSI MEC / NFV** manifests as well with **OpenMANO**

Entity Lifecycle

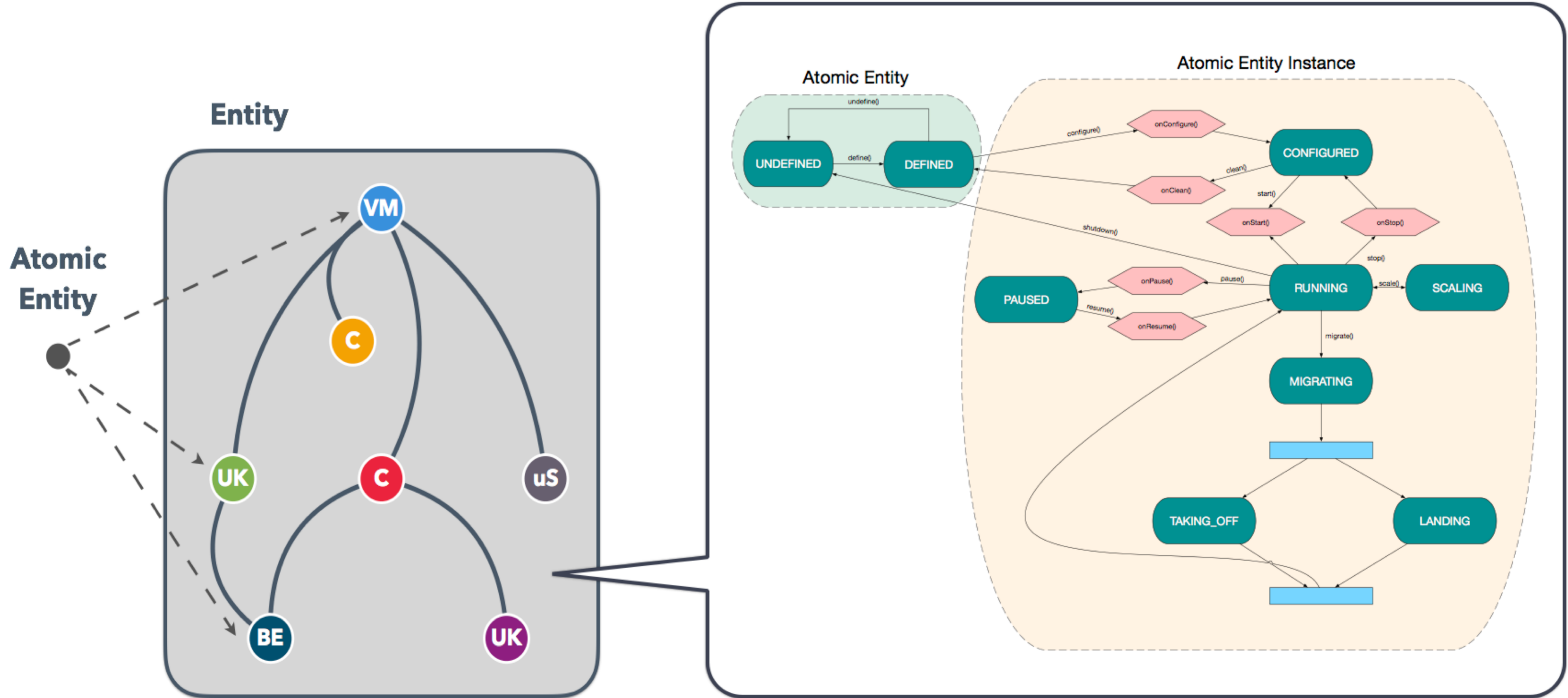
Entity



Entity Instance



Atomic Entity Lifecycle



fogg Ø5

Availability

Getting fogØ5

fogØ5 is going available as Open Source at

<http://github.com/atolab/fog05>

A tutorial and additional information is available at:

<http://fog05.io>

fogØ5

Synergies

Eclipse Kura

fogØ5 could be used as the infrastructure to provision deploy manage and monitor Eclipse Kura

Kura-specific plug-ins could be developed to manage Kura through **fogØ5** distributed store



Eclipse Smart Home

fogØ5 can be a nice complement to smart home

The obvious application is provision management and monitoring

Yet, the distributed data store abstraction provided by could **fogØ5** be quite useful for integration and location transparent operations

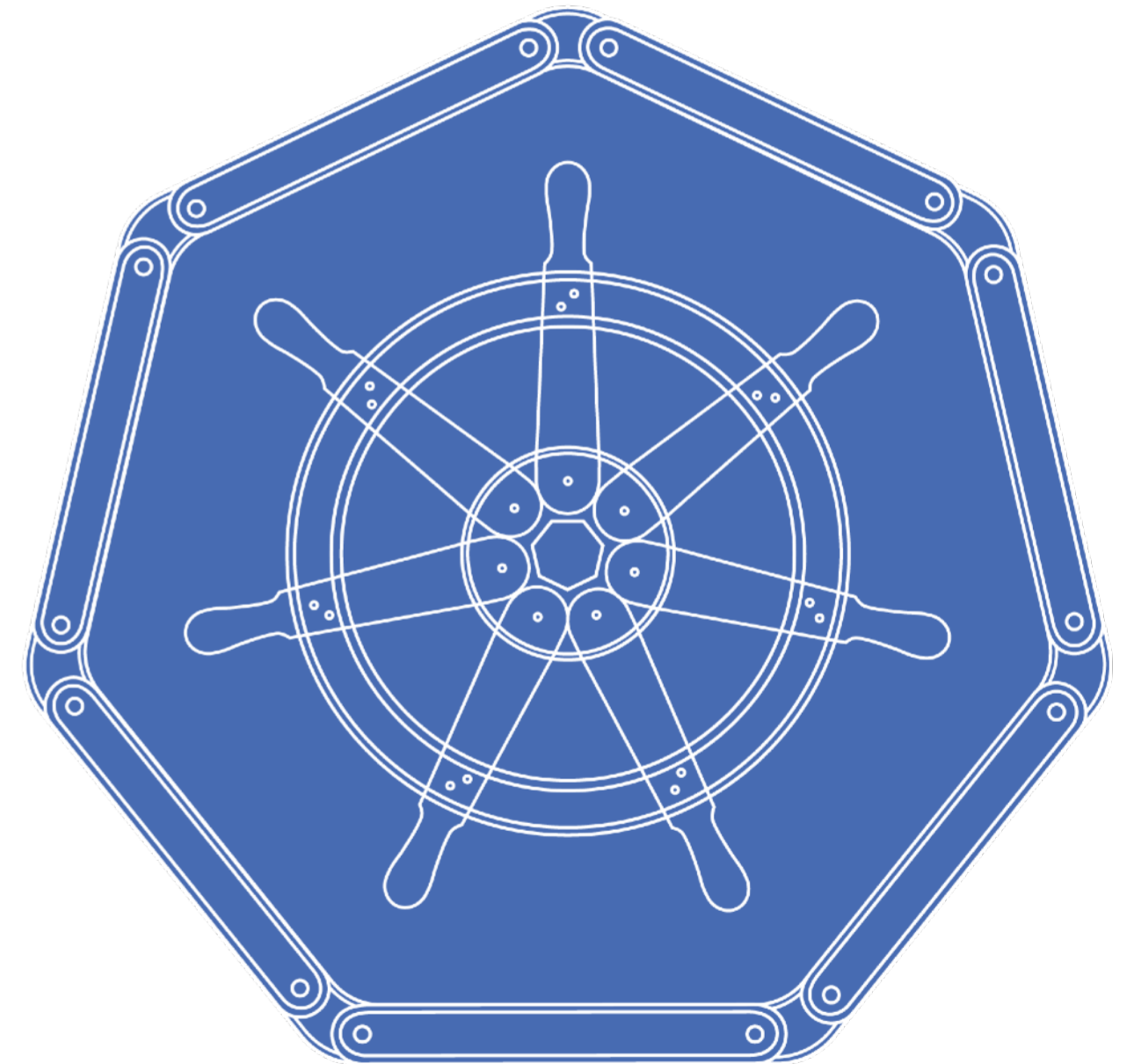


Kubernetes

Kubernetes targets the data centre and focuses on container orchestration

fogØ5 targets the edge, applications like in Industrial and Robotics that require specific I/O and supports an open-ended set of deployment units

Kubernetes managed sub-systems could be integrated with **fogØ5** through a plug-in



Final Remarks

We have been part for the fog-computing community since its inception and want fog computing to happen!

For fog computing to happen we need an open source platform designed ground up to address fog requirements

Let's make fog computing happen together with **Eclipse fogØ5!**



fogØ5



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