



NIMHANS CONVENTION CENTRE,  
HOSUR ROAD, BANGALORE



11-12 October  
2018

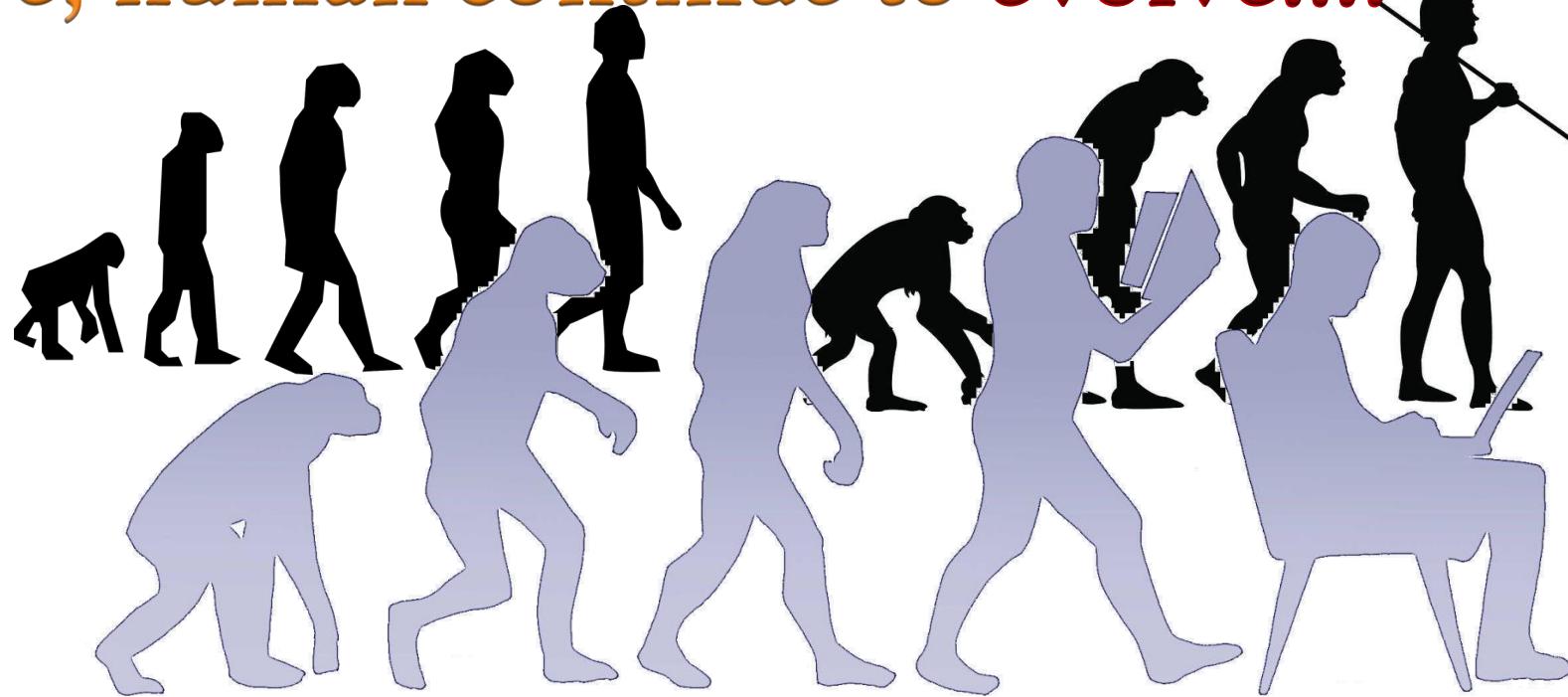
# CNCF & Building Edge Cloud using Kubernetes

Presenting - We are Kumar Brothers...  
Krishna Kumar & Sanil Kumar



Once upon a time...  
See the video here –  
<https://www.youtube.com/watch?v=ystdF6jN7hc>

# We, human continue to evolve...!



....to a rectangle...!



Actually to a smaller rectangle...!

# ...that's why...



**BIG DATA**

ANY BECOMES BLANKET  
TOOLS TRANSFER ANALYSIS INCLUDE  
DATA SHARING CAPTURE DEPENDENCE  
STORAGE AND THE ENABLE  
MANAGEMENT PROCESSING ON-HAND  
CHALLENGES FROM DIFFICULTIES THAT EXPLORE  
SIMULATION PROCESS APPLICATIONS IS A DATABASE  
BUT IT'S PROCESS PROBLEMS SEARCH  
VISUALIZATION

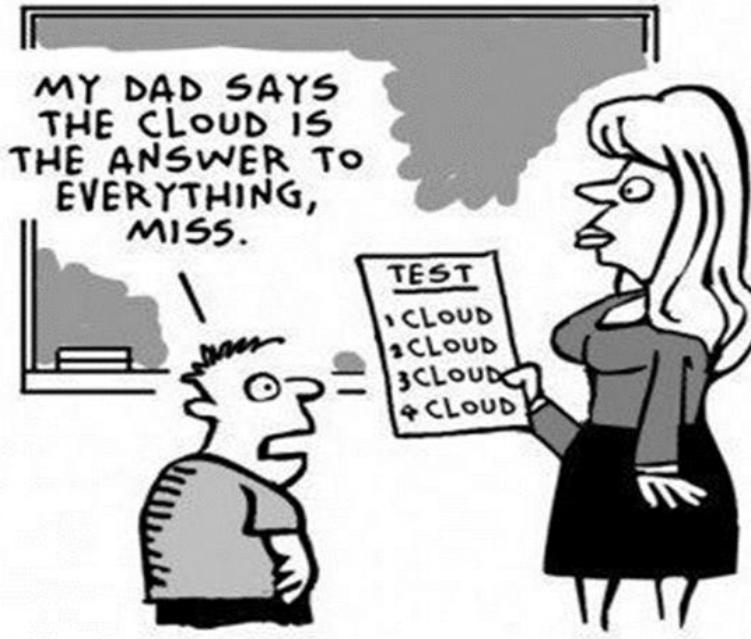
**VOLUME**

3V FARM ASSETS FOR FARM FLOW  
NEW SOURCES DOUG LANEY SYSTEMS SIZE  
ENVIRONMENTAL GOVERNMENT

**PROCESSING**

TRIGGER HANGLE THINGS AREAS DENSITY OUT  
ENHANCED DISCOVERY WIRELESS HUNDREDS RESEARCH SIMULATIONS NETWORKS  
CAPABILITIES BUSINESS SOFTWARE WORKERS  
ENTERPRISE INTERNET SCIENTISTS SPEED PACKAGE REPORT TAKE  
DECISION GENOMICS INTEGRATION PETABYTES DATA RANGE VARIETY VELOCITY INFORMATION  
PACKAGES OPTIMIZATION INTEGRATION IN PETABYTES AMOUNT IN DATA RANGE THAT VARIETY VELOCITY AND INFORMATION  
CURATE RELATIONAL METEOROLOGY ENVIRONMENTAL STATISTICS GROWNS DOMAIN GROWS  
REQUIRE

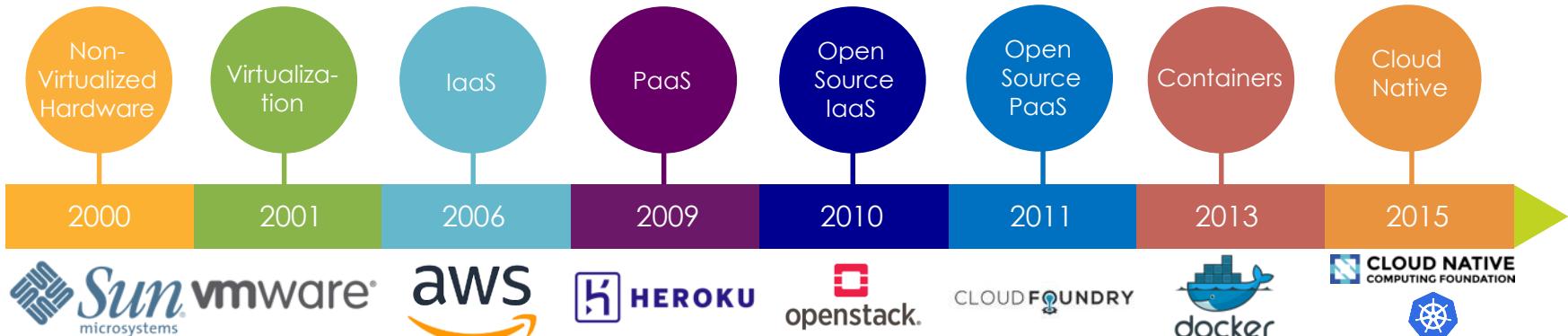
# CLOUD COMPUTING



# Cloud Native: CNCF (2015)



- Cloud native computing uses an open source software stack to:
  - segment applications into *microservices*,
  - package each part into its own container
  - and dynamically orchestrate those containers to optimize resource utilization



# Avoid Vendor Lock-in



Open source software stack enables deployment  
on any public, private cloud or hybrid cloud

# Enable Unlimited Scalability



Scales from several nodes on your laptop to tens of thousands of self-healing multi-tenant nodes

# Increase Agility and Maintainability



By splitting applications into microservices  
with explicitly described dependencies

# Achieve Resiliency



To failures of individual containers, machines, and even data centers and to varying levels of demand

# Improve Efficiency and Resource Utilization

A photograph of a classical music performance. A female conductor in a white dress stands in the center of a stage, holding a baton and gesturing. She is surrounded by musicians in dark uniforms playing violins and cellos. In front of them, a grand piano is visible. The stage is filled with musical score stands. In the background, the dark auditorium is filled with spectators. The lighting is dramatic, highlighting the performers on stage.

Via a central orchestrating process that dynamically manages and schedules microservices

# Presentation received from Dan Played as it is ..... for 20minutes..

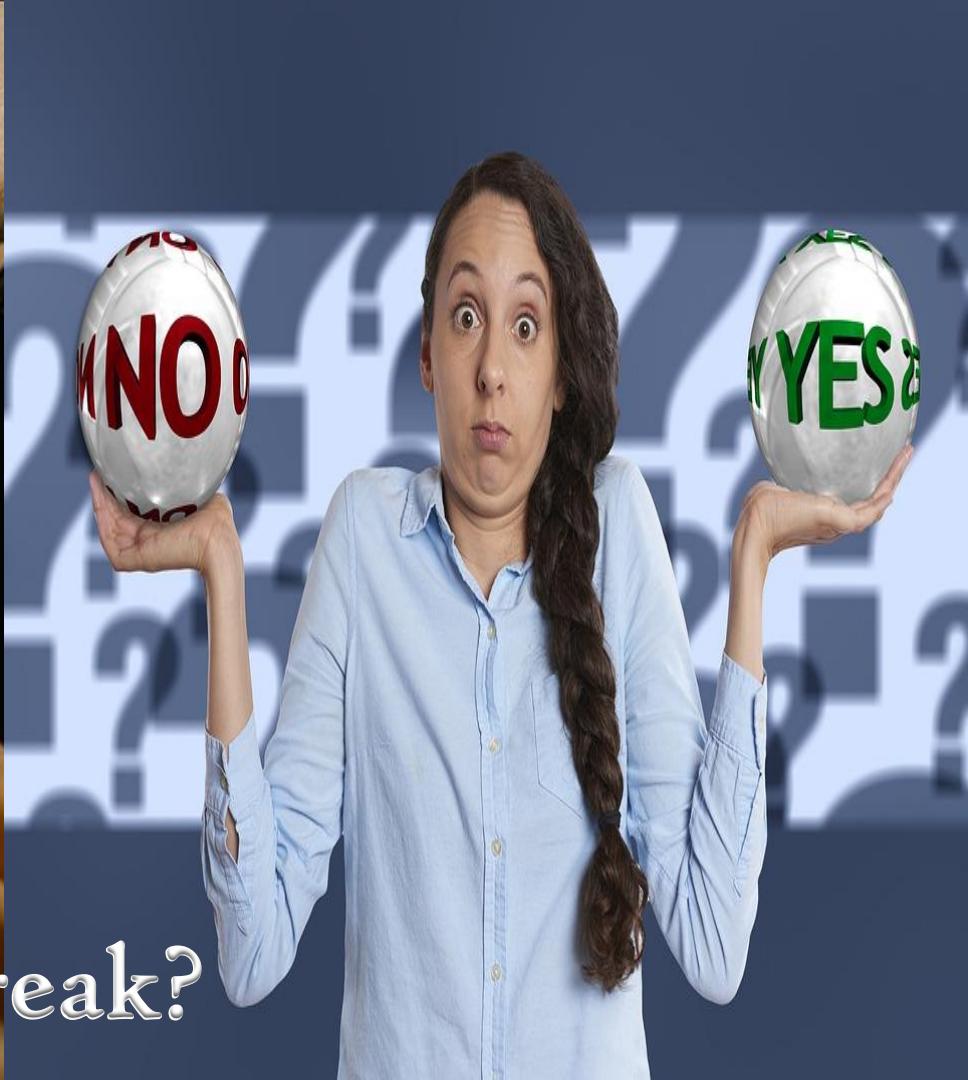
## CNCF Overview

Dan Kohn, Executive Director, [@dankohn1](https://twitter.com/dankohn1)

This presentation is available at:  
<https://github.com/cncf/presentations>



...waa..nna break?



# Auto Annadurai..

See the video here -

[https://www.youtube.com/watch?v=P\\_94f7Grkp8](https://www.youtube.com/watch?v=P_94f7Grkp8)

Is it the next Edge?

# We are becoming smarter....!

# Weren't we smart...?



**Quipu / Khipu**

**a wearable data storage and communication system**

*cord color, manner of connection, relative placement, cord spacing, the types and placement of knots on individual cords*

**500 to 5000 years ago**

We want to be smarter and smarter...



71%

of those aged  
**16 to 24**  
want wearable tech

Source: GlobalWebIndex

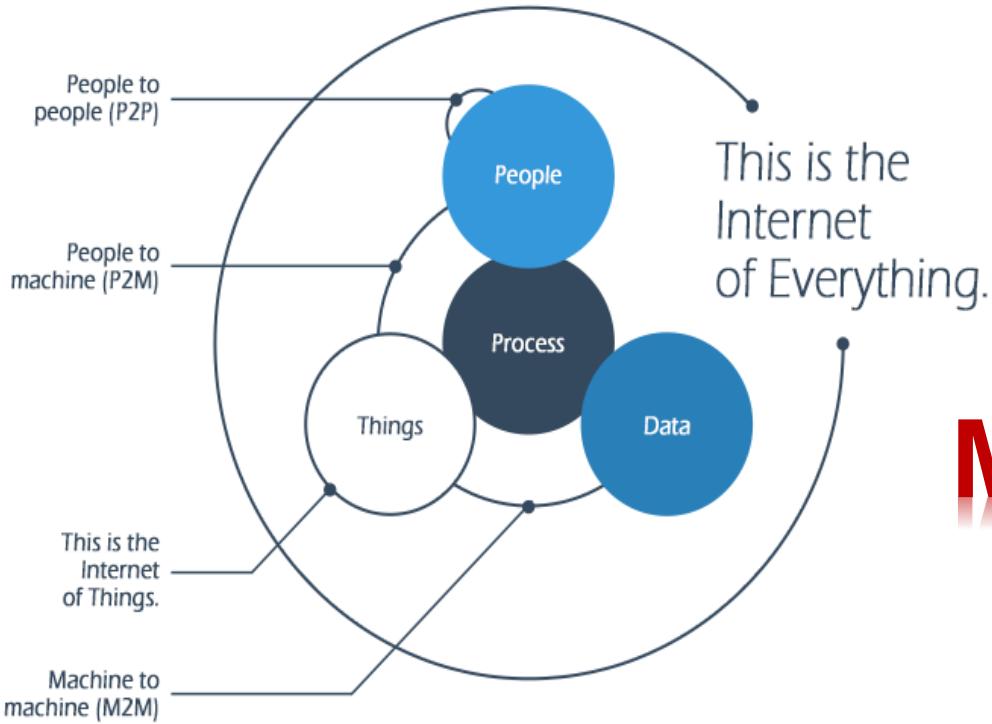
# THE INTERNET **OF EVERYTHING** IS HERE.

As the Internet evolves, so will we.



**37 billion** new things will be **connected by 2020**.





# Moving to Edge!

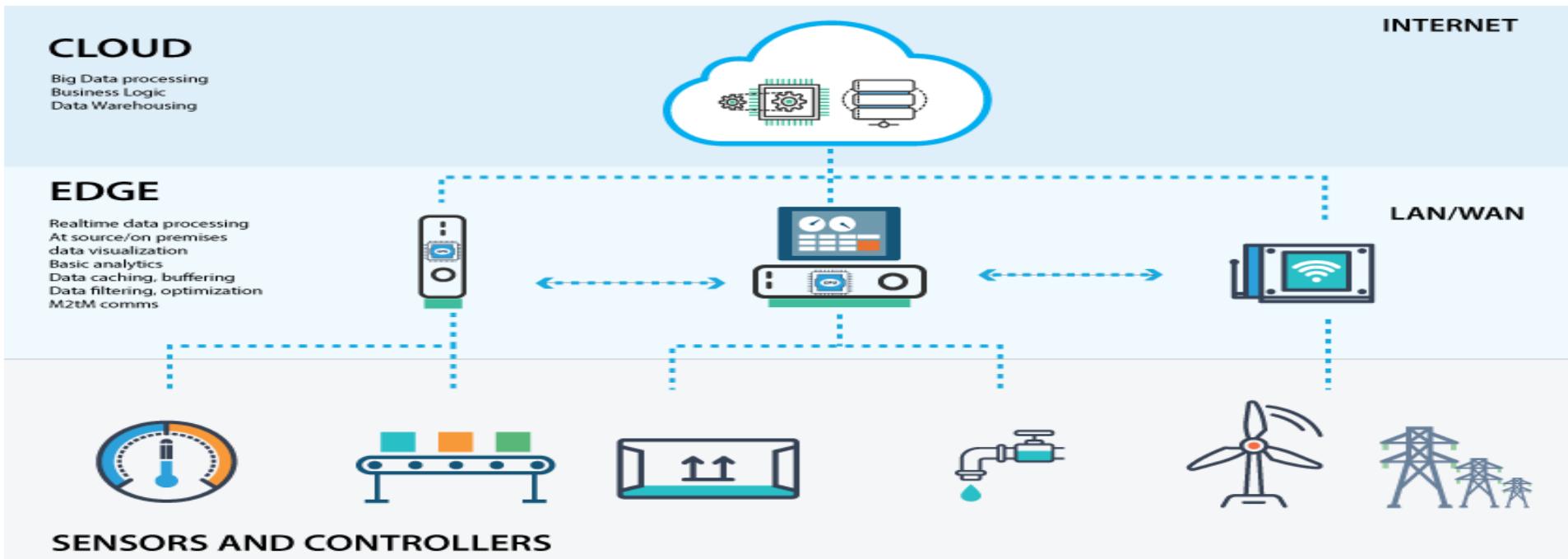
# Centralized to De-centralized to Distributed!

# Edge?



# Edge computing

is a method of optimizing cloud computing systems by performing data processing at the edge of the network, near the source of the data.



# ...and...why Edge?

**Increasing costs** of shipping the large volumes of data to the cloud for processing and storage.

**Reduce the Cost**

**Trust & Security**

**Data governance and security** – many organizations have sensitive data that they don't want to leave their premises under any circumstances.

**Real-time decision making** –the latencies involved in shipping the data to the cloud for analytics are unacceptable.

**Real time, Ultra Low Latency**

**Offline, Independent**

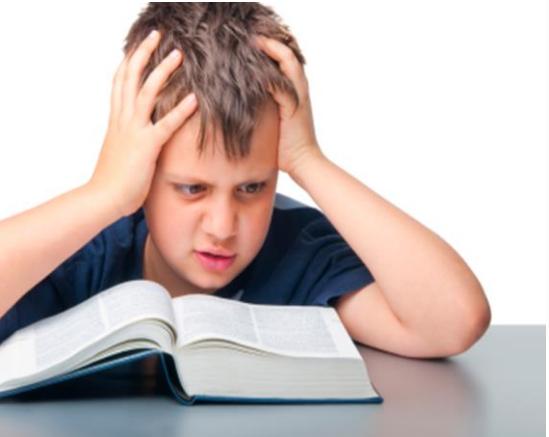
**The possibility of intermittent cloud connectivity** is a serious concern for mission-critical IoT applications such as a connected vehicle or other types of autonomous systems.

Roof Computing?



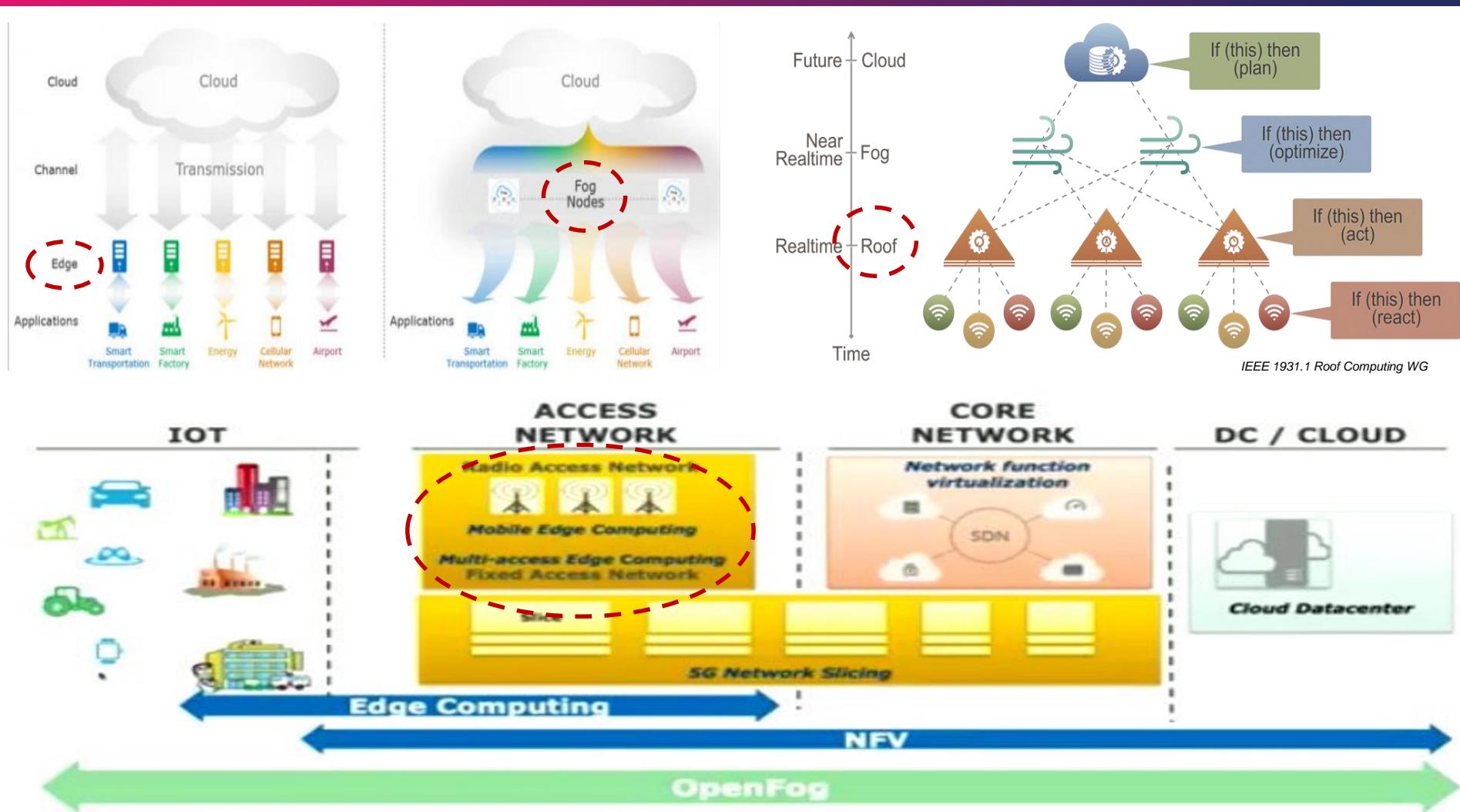
MEC ?

Fog Computing?

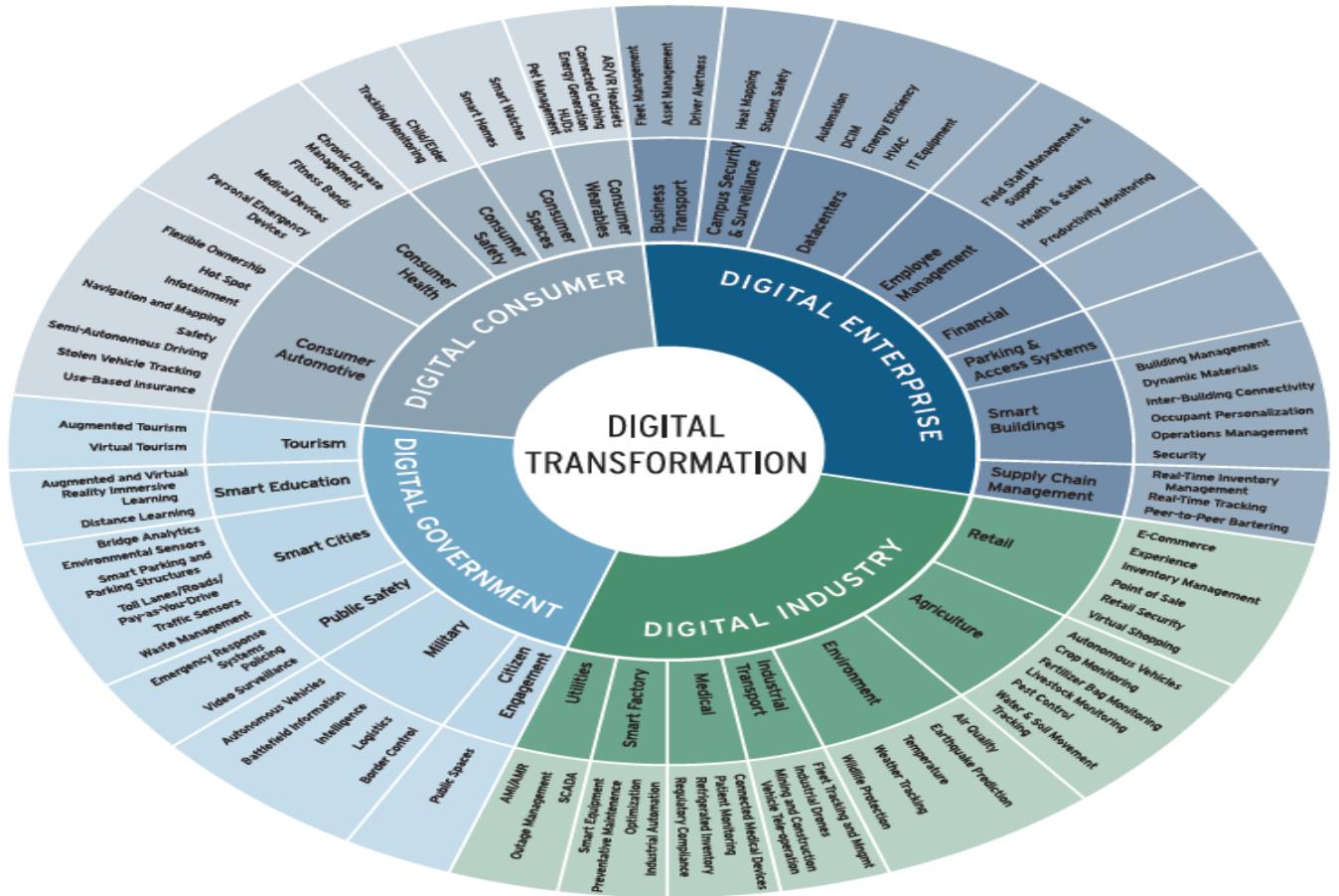


Edge Computing?





# The Markets and Usecases...



## Applications (Verticals)

### Personal Devices



### Lifestyle



### Connected Home



### Industries



### Industrial Internet



## Platforms & Enablement (Horizontals)

### Connectivity/Dev Platforms

### Software/Data Platforms



### Open Source Platforms



### Sensor Networks



### Personal Interfaces



## Building Blocks

### Protocols



### Cloud



### Mobile



### Processors

### Sensors



### M2M Networks



### Portable WiFi



### Telecom



### M2M



# Some of the edge platforms...



The Open Platform for the IoT Edge



Open Source Software Stack Supporting  
High-Availability Cloud Services Optimized For Edge



StarlingX is a fully featured and high performance Edge  
Cloud software stack

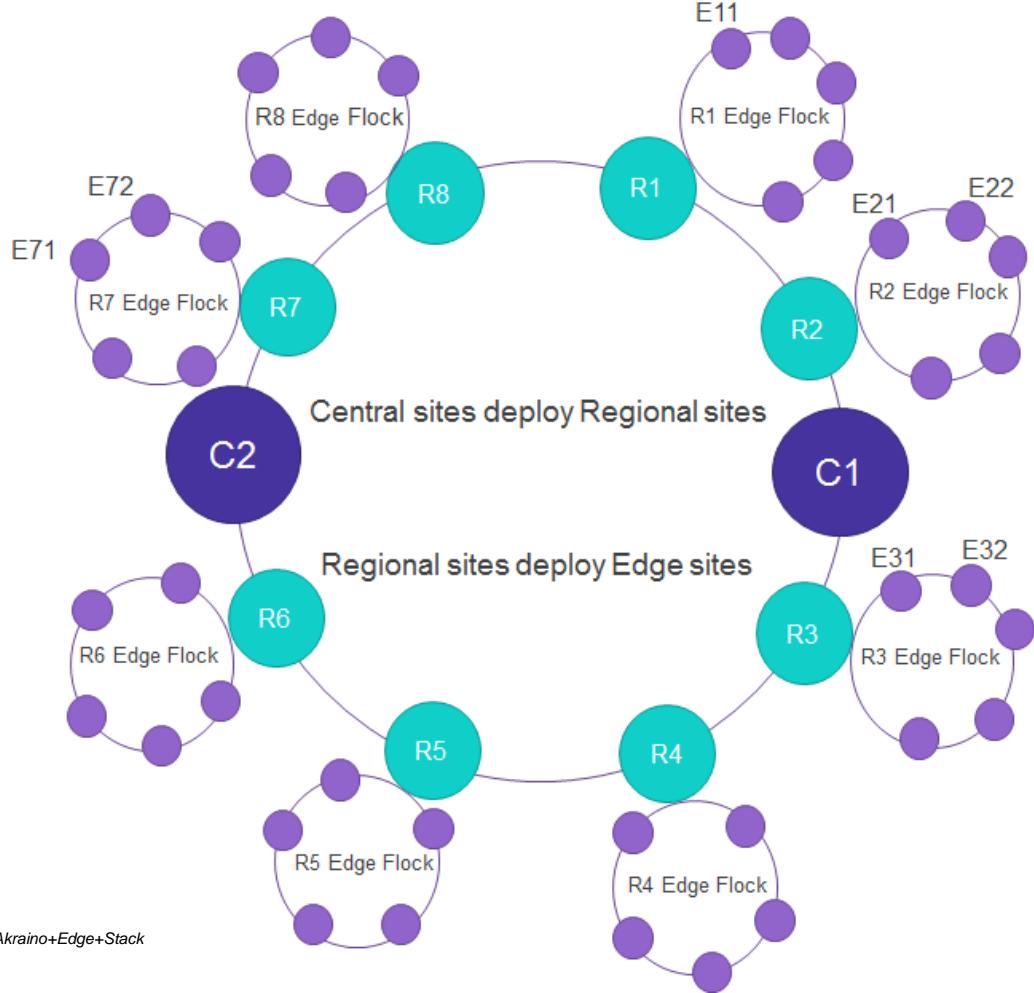


Specific Edge Platform



<https://github.com/forestgiant>

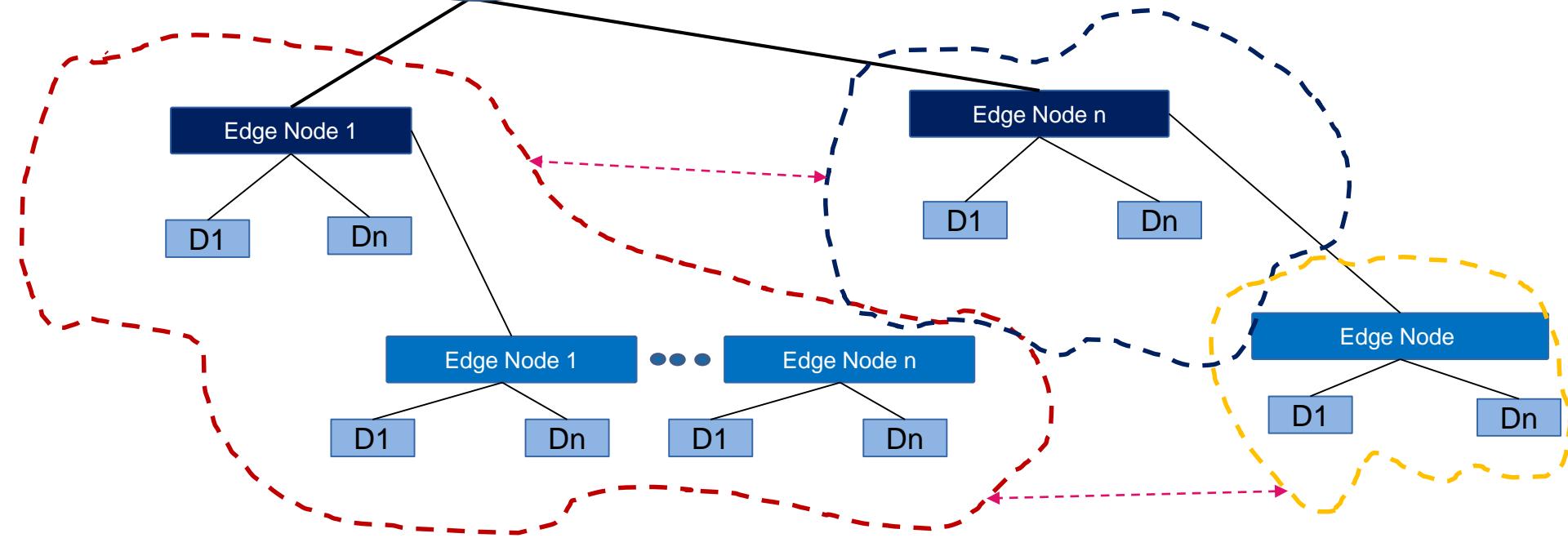
An Open-Source Platform for Edge Computing



E: Edge Site  
R: Regional Site  
C: Central Site



- Edge Clusters
- Scalable & Distributed
- North-South, East-West Communication
- Monitoring and Logging
- Security
- Different Resource Systems



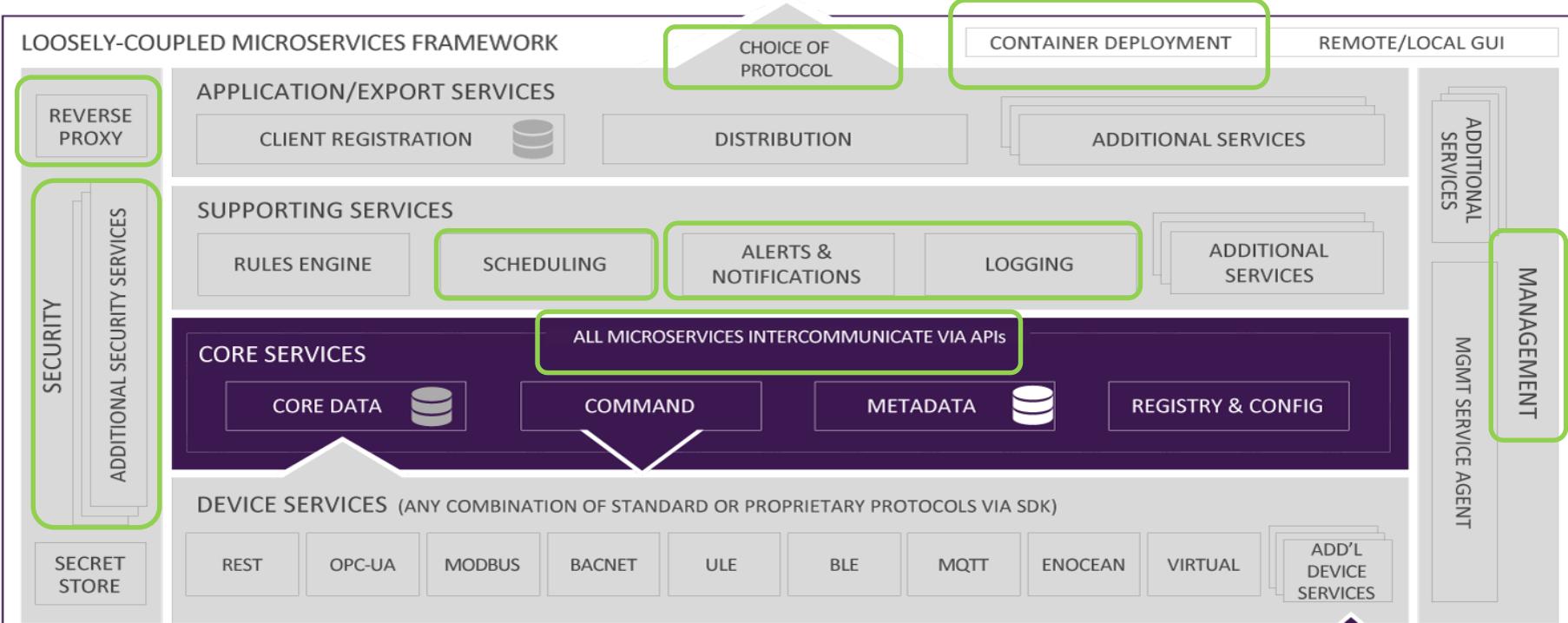
## Sample Edge Deployment View



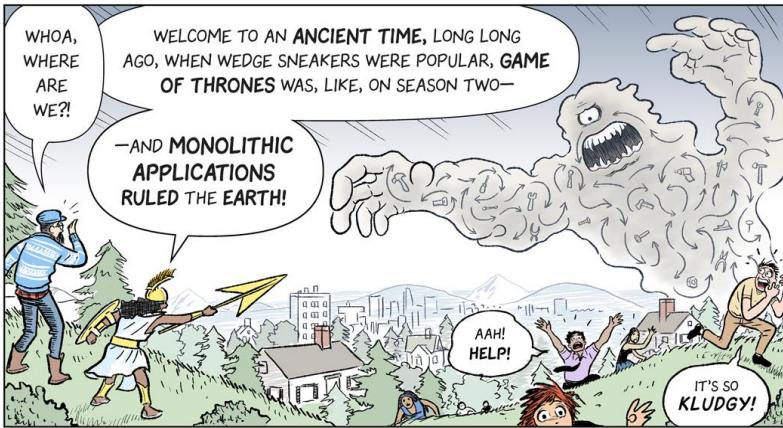
REQUIRED INTEROPERABILITY FOUNDATION

REPLACEABLE REFERENCE SERVICES

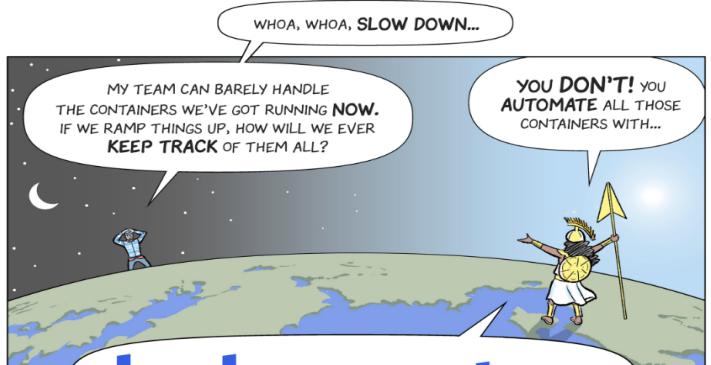
## “NORTHBOUND” INFRASTRUCTURE AND APPLICATIONS



## “SOUTHBOUND” DEVICES, SENSORS AND ACTUATORS



—ANYWHERE AND ANYTIME ACROSS THE WORLD!



# kubernetes

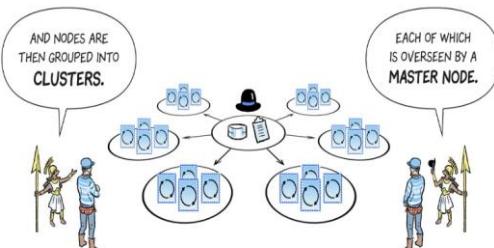
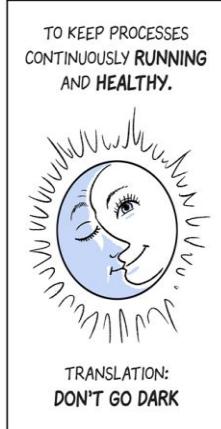
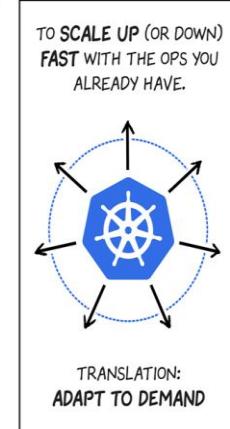
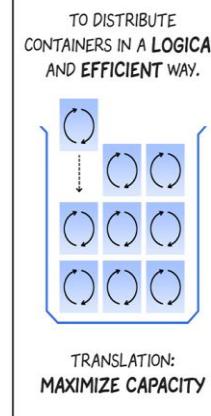
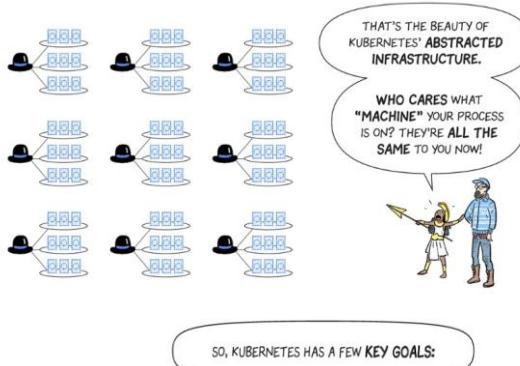
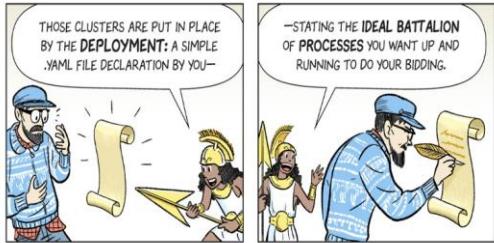
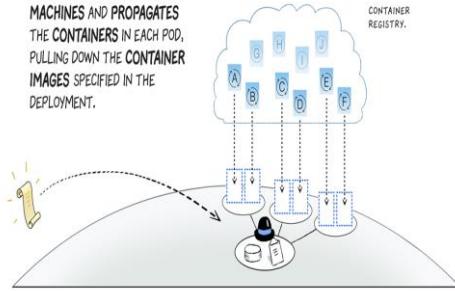
IT'S GREEK FOR  
"HELMNSMAN."



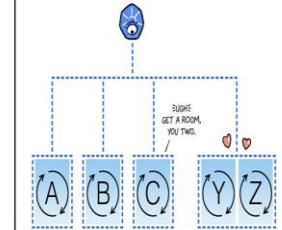
ALSO... STAR TREK  
IN-JOKES.\*



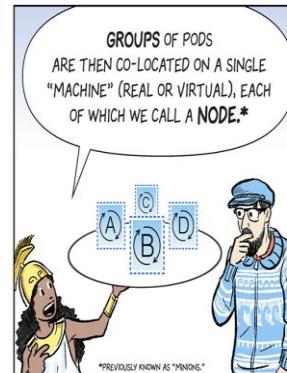
KUBERNETES THEN SELECTS THE MACHINES AND PROPAGATES THE CONTAINERS IN EACH POD, PULLING DOWN THE CONTAINER IMAGES SPECIFIED IN THE DEPLOYMENT.



MOST PODS HOLD JUST ONE CONTAINER, THOUGH TIGHTLY-COUPLED PROCESSES WILL SOMETIMES SHARE A POD.



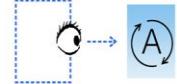
GROUPS OF PODS ARE THEN CO-LOCATED ON A SINGLE "MACHINE" (REAL OR VIRTUAL), EACH OF WHICH WE CALL A NODE.\*



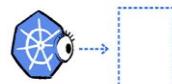
\*PREVIOUSLY KNOWN AS "MINIONS."



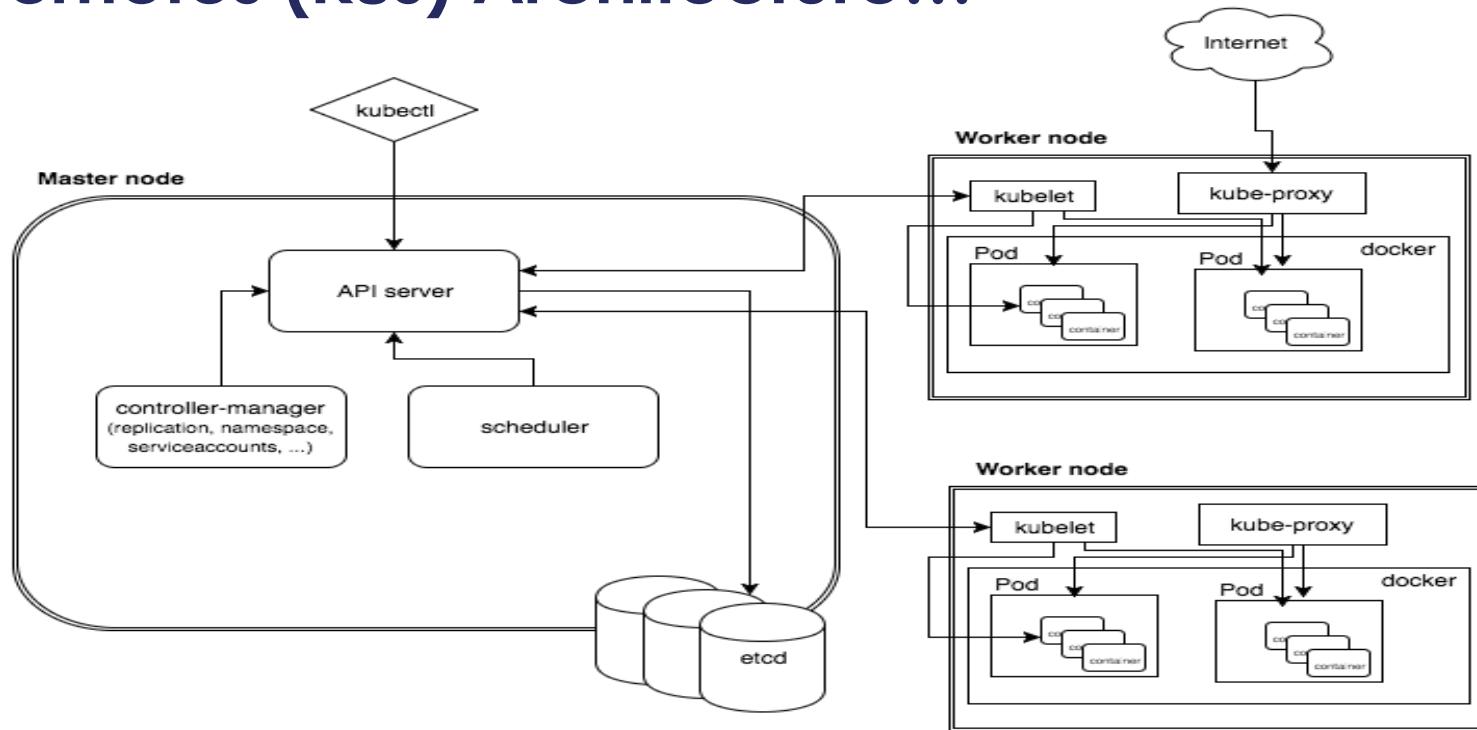
PODS ARE THE SMALLEST BUILDING BLOCK IN THE KUBERNETES OBJECT MODEL. THE POD "SEES" THE CONTAINER—



—BUT KUBERNETES ONLY SEES THE POD.



# Kubernetes (k8s) Architecture...



One or more **master nodes**

One or more **worker nodes**

Distributed key-value store, like **etcd**

<https://kubernetes.io/docs/concepts/>

## Orchestration and Provisioning of Edge Nodes



Edge Node Manager



Deployment Templates

Central Cloud

Edge Cloud



Deployment Templates

Orchestration and Provisioning of Edge Nodes  
Orchestration and Management of Microservices

EN1

Edge Controller

EN1

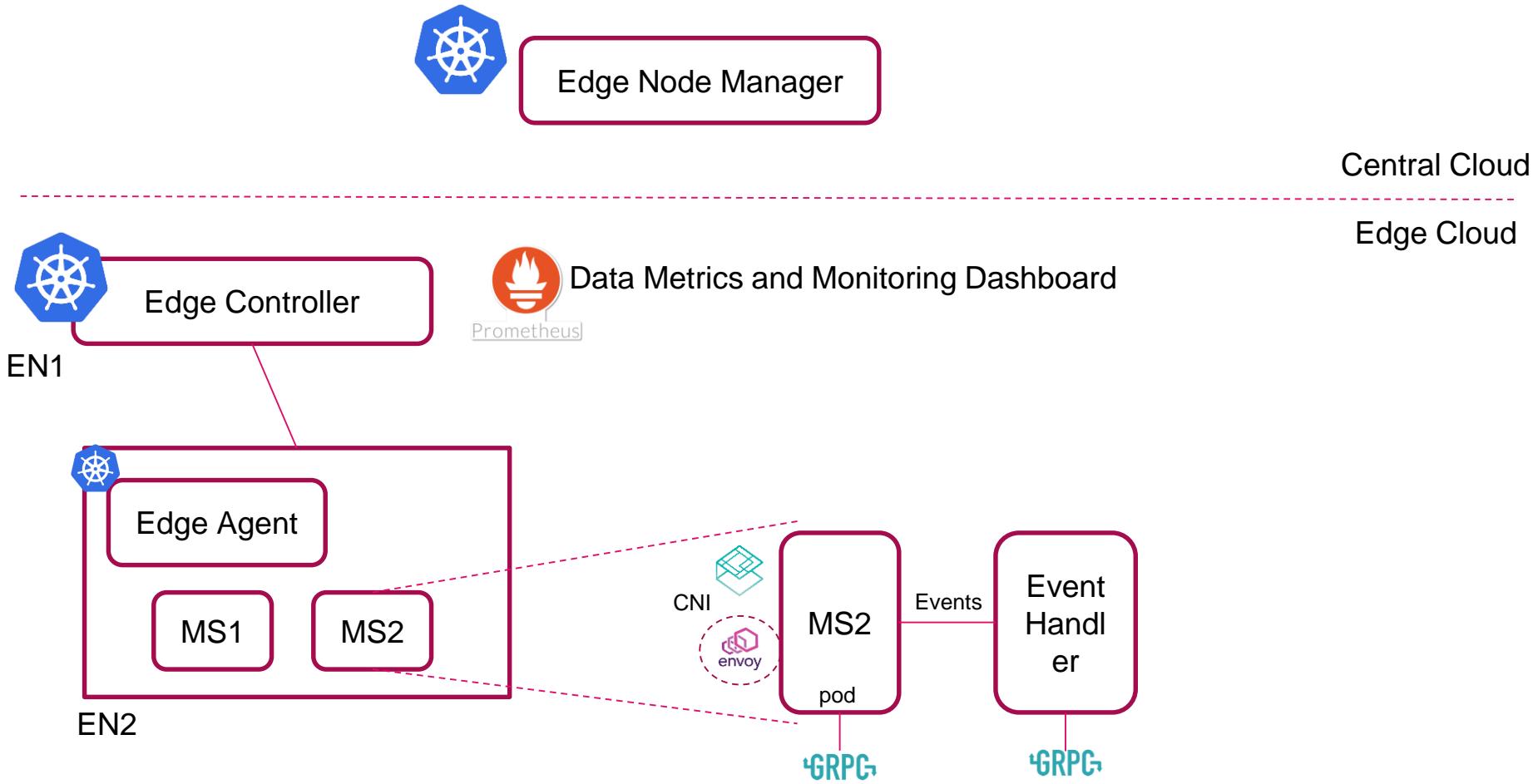


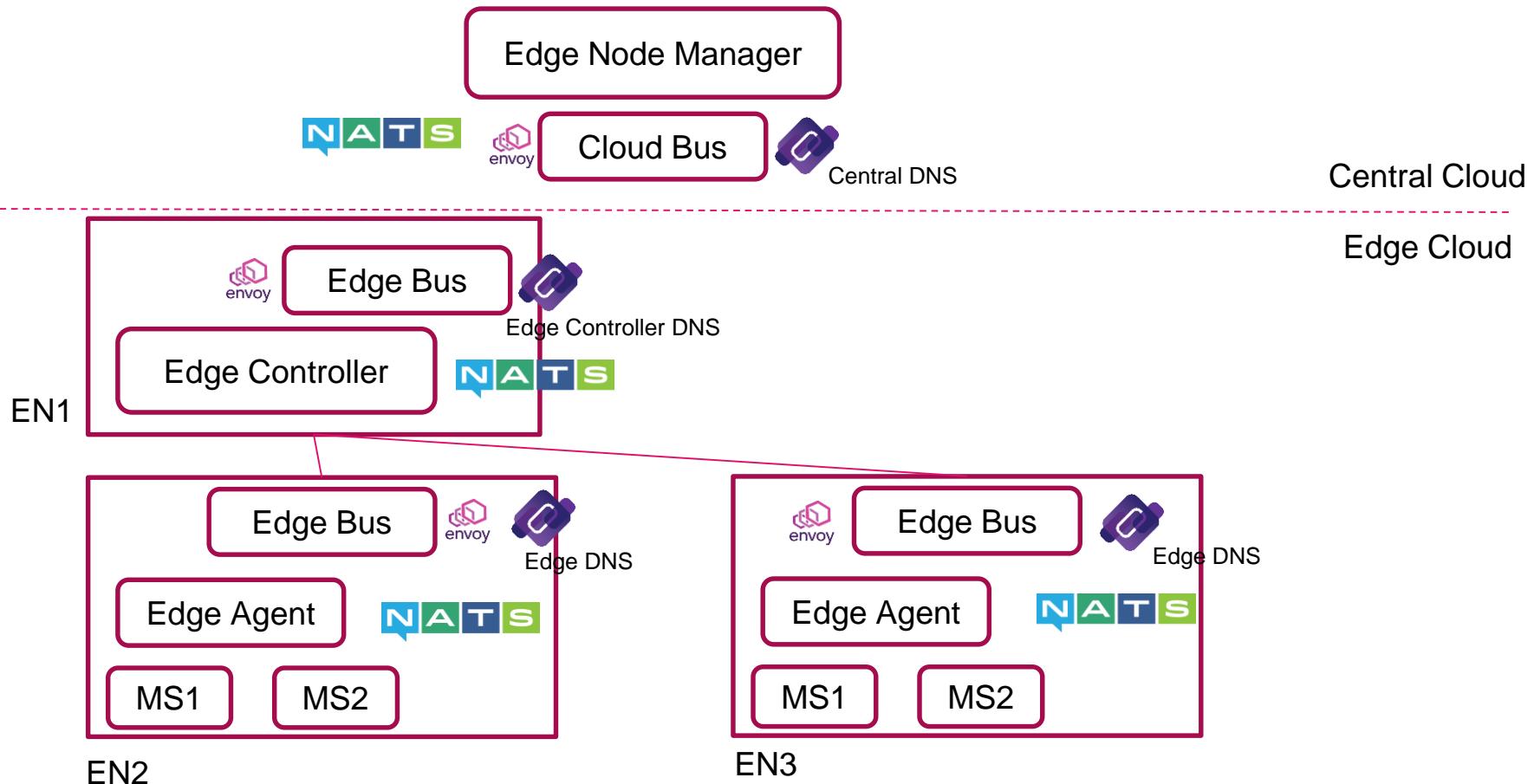
EN2

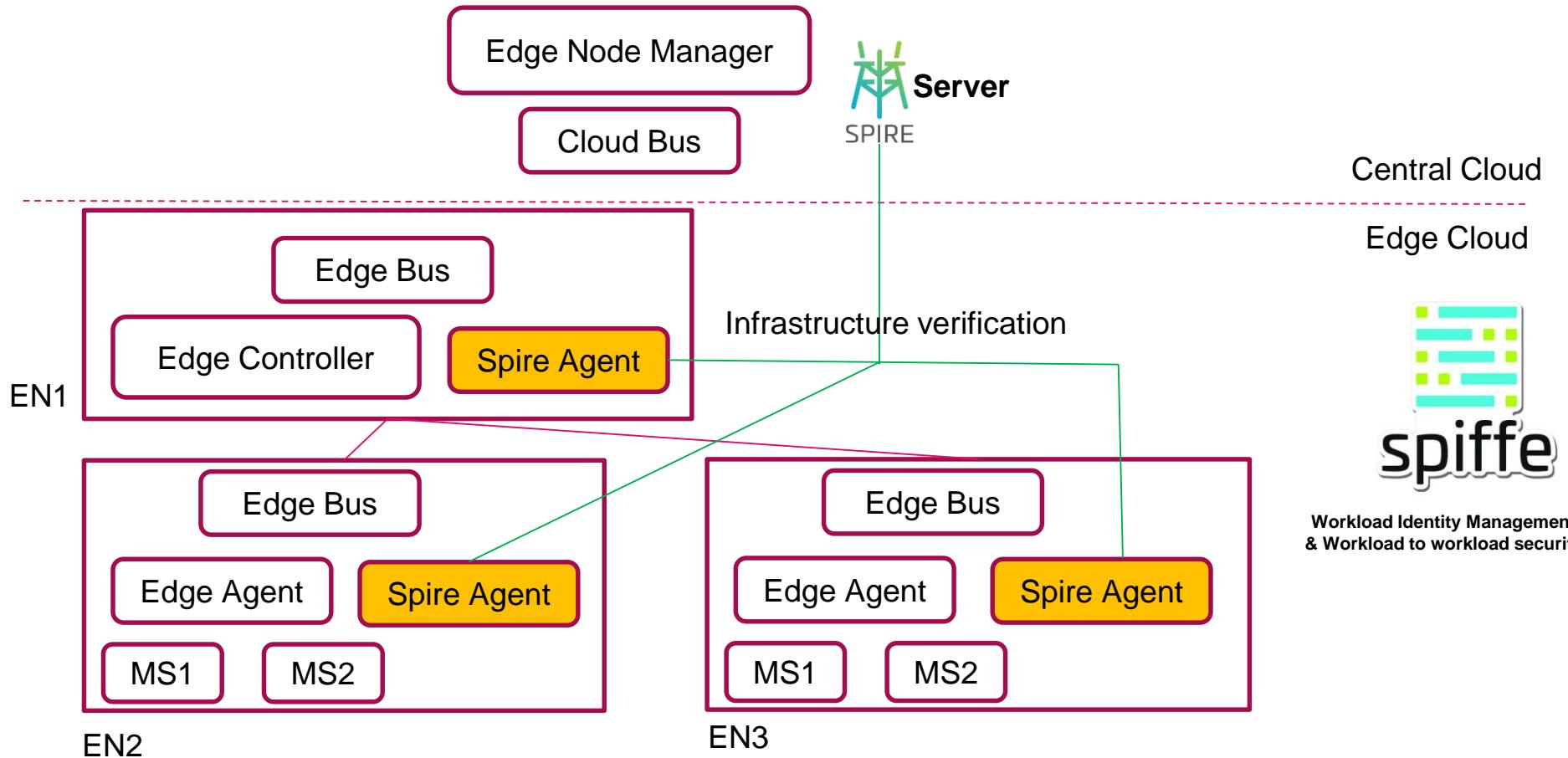


EN3

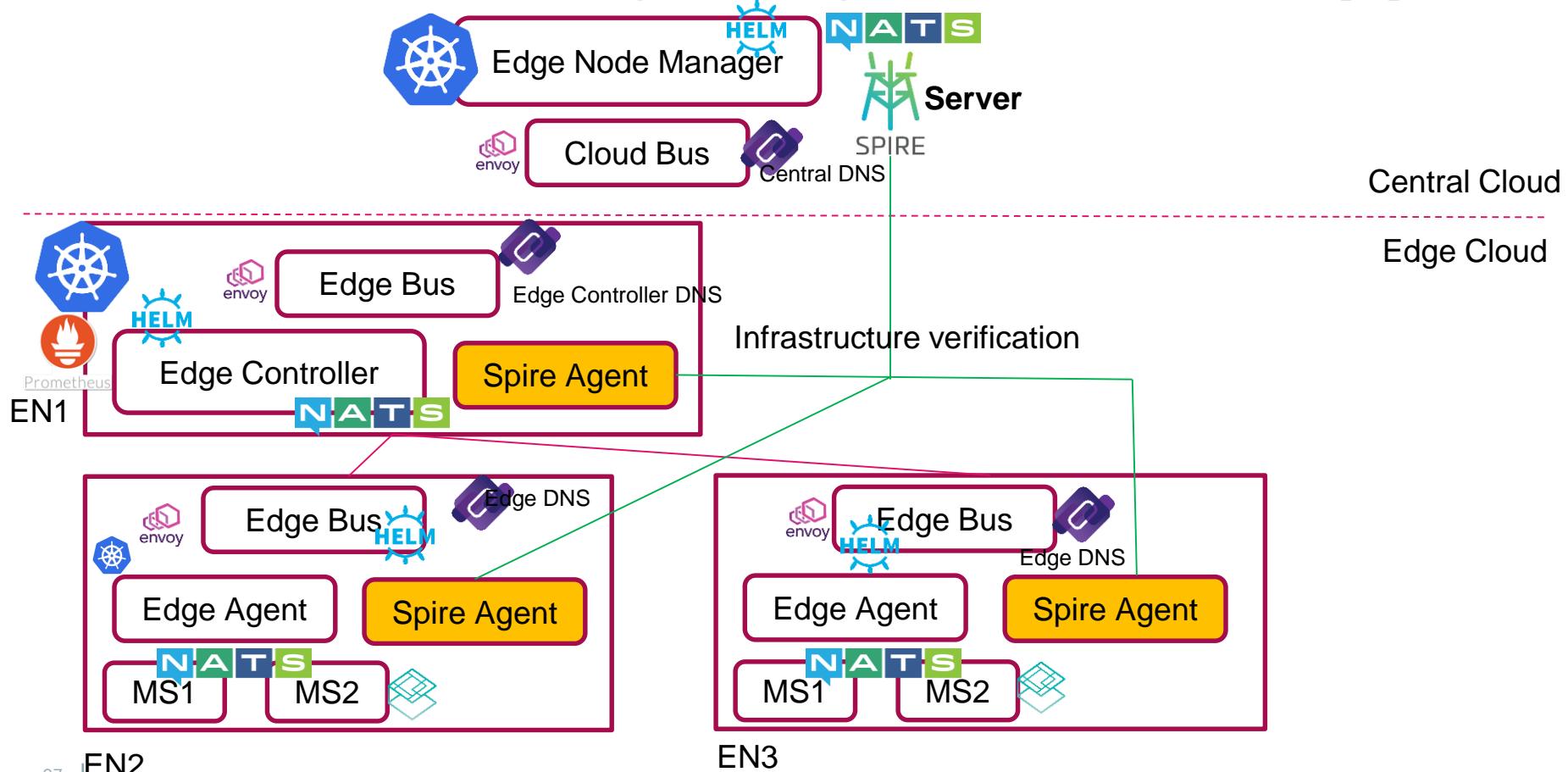
Each Microservice on container or pod







# Cloud Cluster moving to Edge : Foster CNCF(1)



# Cloud Cluster moving to Edge : Foster CNCF(2)

**Kubernetes** : Orchestration and Management of Edge Nodes and or workloads

**Prometheus** : Data Metrics and Monitoring Dashboard

**Helm** : Deployment Charts

**Envoy**: Proxy and Reverse Proxy for North-South and East-West

**Core DNS** : DNS resolution and management (it helps for east west or north south DNS resolution)

**CNI** : Workload networkings (container /pod)

**gRPC**: Workload messaging

**NATS** : Optimized Messaging service (esp for streaming data) for applications (pub/sub)

**Spiffe (spire)** : workload to workload identity and authentication

We can also have....**cloudevents** for Serverless, **rook** for storage, **opentracing** for distributed tracing, **Opa** for policy management..

Of course, **rkt** and **conatinerd** are part of our container runtime...  
...and more based on your deployment....

Edge Cluster is a ~distributed Cloud Cluster...

# Autonomous Edge Vehicle.

See the video here –

<https://www.youtube.com/watch?v=8ClchxiVMoY>

*Edge is heading here..*

# The Story Continues...

## Edge is Cloud....! Cloud be With you!



Thank You! Kumar Brothers!

Krishna Kumar & Sanil Kumar



## ...so as CNCF!