LF NETWORKING

LFN Developer & Testing Forum

LF NETWORKING

LFN Developer & Testing Forum

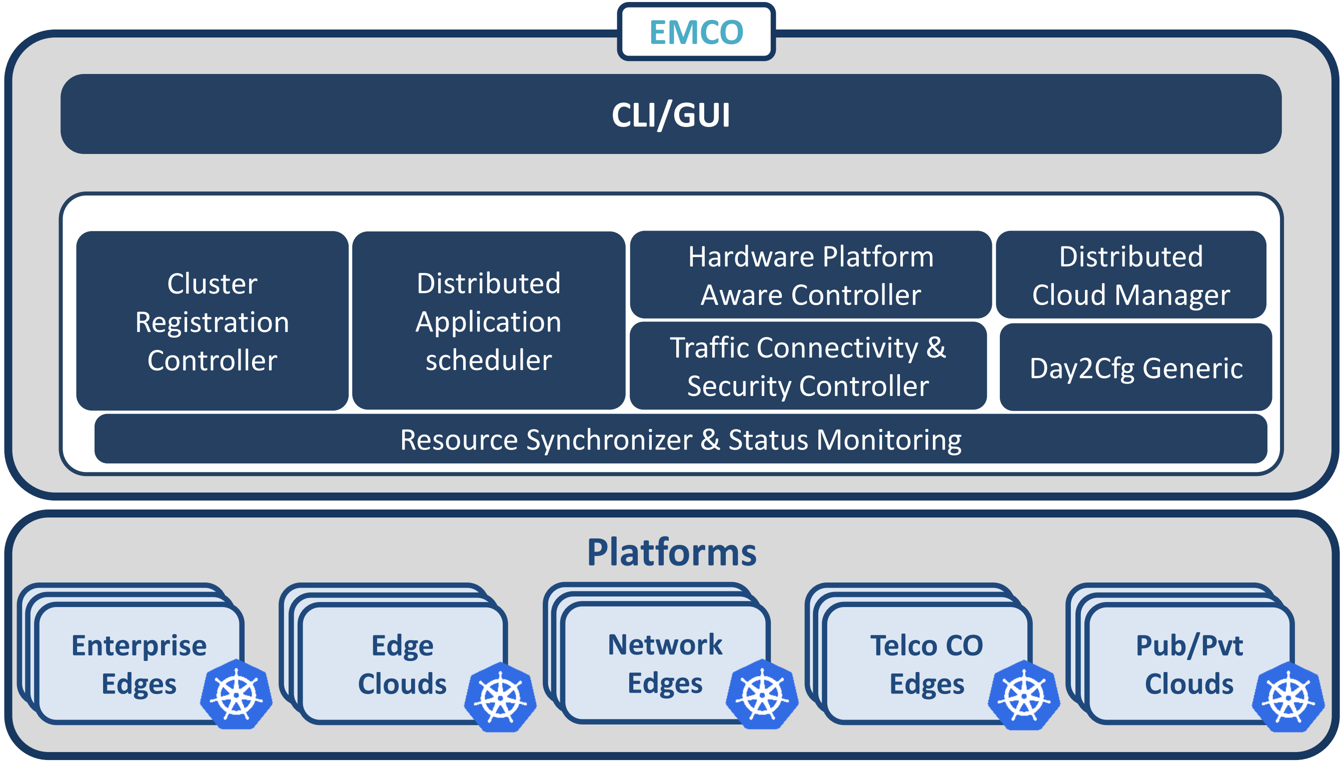
EMCO: Logical Clouds

Distributed Cloud Manager

Igor D.C. *@igordcard @igordc*

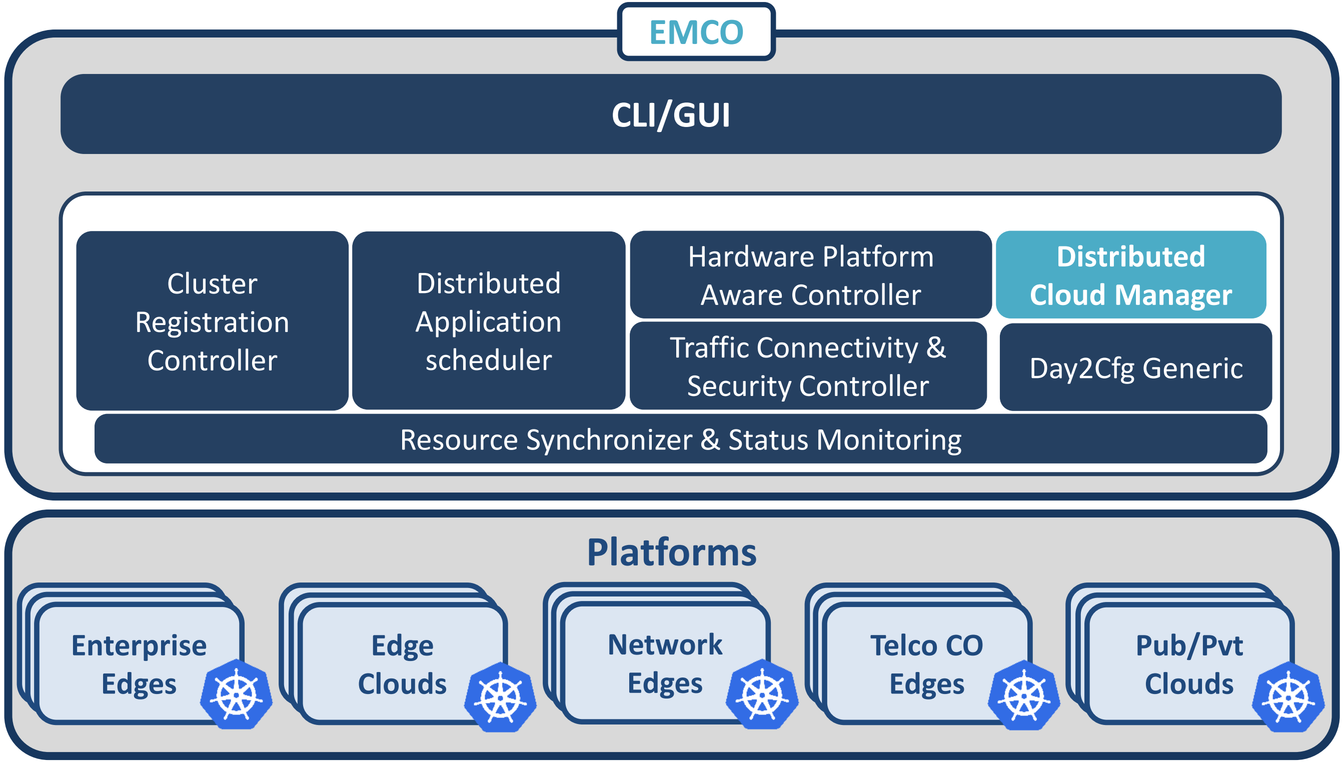
Ritu Sood

From the EMCO overview earlier


EMCO
CLI/GUI
Cluster Registration Controller
Distributed Application scheduler
Hardware Platform Aware Controller
Distributed Cloud Manager
Traffic Connectivity & Security Controller
Day2Cfg Generic
Resource Synchronizer & Status Monitoring
Platforms
Enterprise Edges
Edge Clouds
Network Edges
Telco CO Edges
Pub/Pvt Clouds

- **Cluster Registration Controller** registers clusters by cluster owners
- **Distributed Application Scheduler** provides simplified, and extensible placement; tenant mgmt; LCM implementation
- **Hardware Platform Aware Controller** enables scheduling with auto-discovery of platform features/ capabilities; Others: Cost, Power Savings, Latency aware… (WIP)
- **Distributed Cloud Manager** presents a single logical cloud from multiple edges
- **Traffic Connectivity controller** auto-configure service mesh (ISTIO) and security policy (NAT, firewall), DNS and SLB entities of edges - WIP
- **Day2 generic configuration** configures Day2 configuration of any app/network function via templates & configs - WIP
- **Resource Synchronizer & Monitoring** synchronizes resources across multiple edge/cloud platforms and then monitors the status of deployed resources

From the EMCO overview earlier

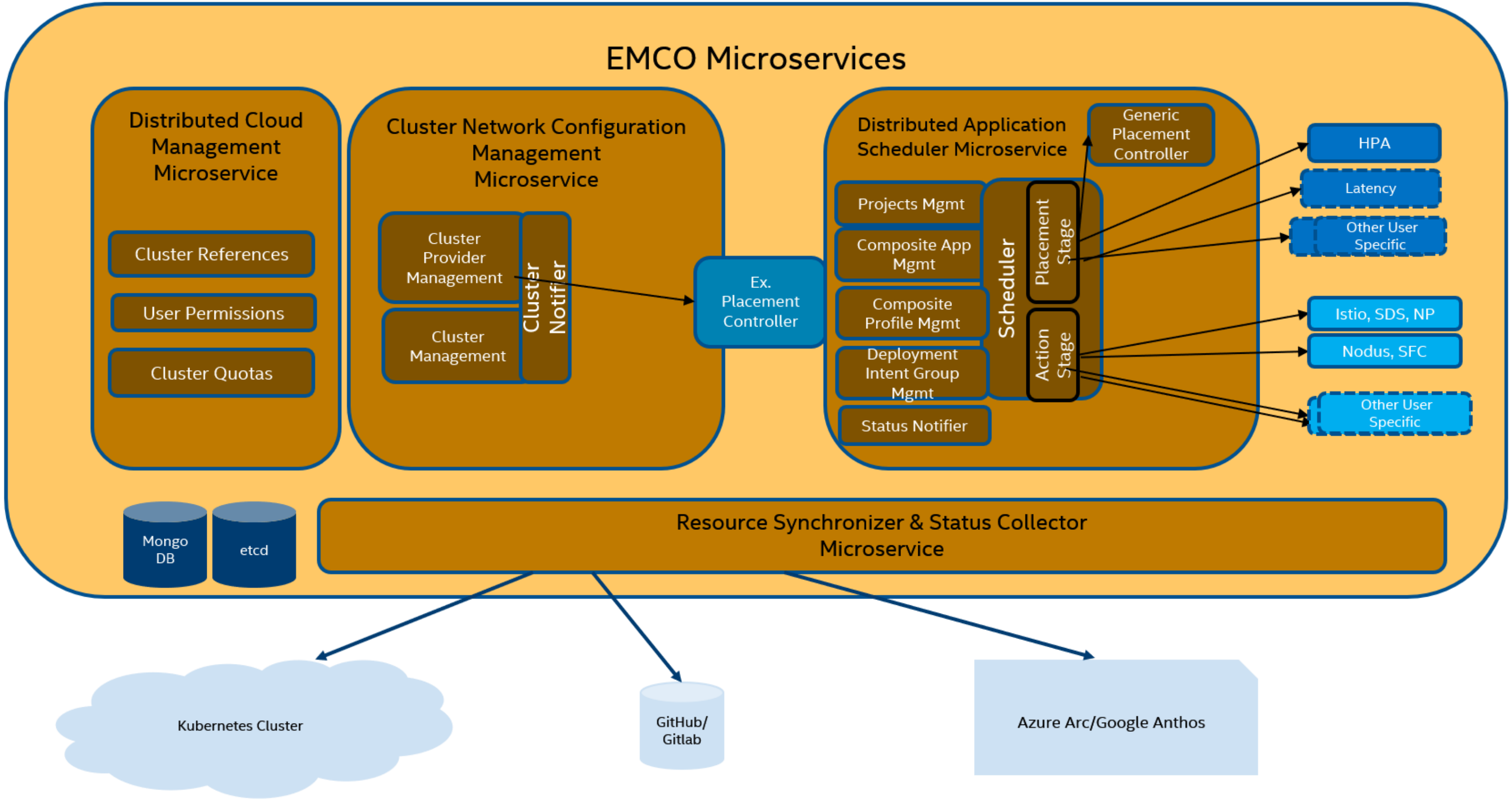


EMCO
CLI/GUI
Cluster Registration Controller
Distributed Application scheduler
Hardware Platform Aware Controller
Distributed Cloud Manager
Traffic Connectivity & Security Controller
Day2Cfg Generic
Resource Synchronizer & Status Monitoring
Platforms
Enterprise Edges
Edge Clouds
Network Edges
Telco CO Edges
Pub/Pvt Clouds

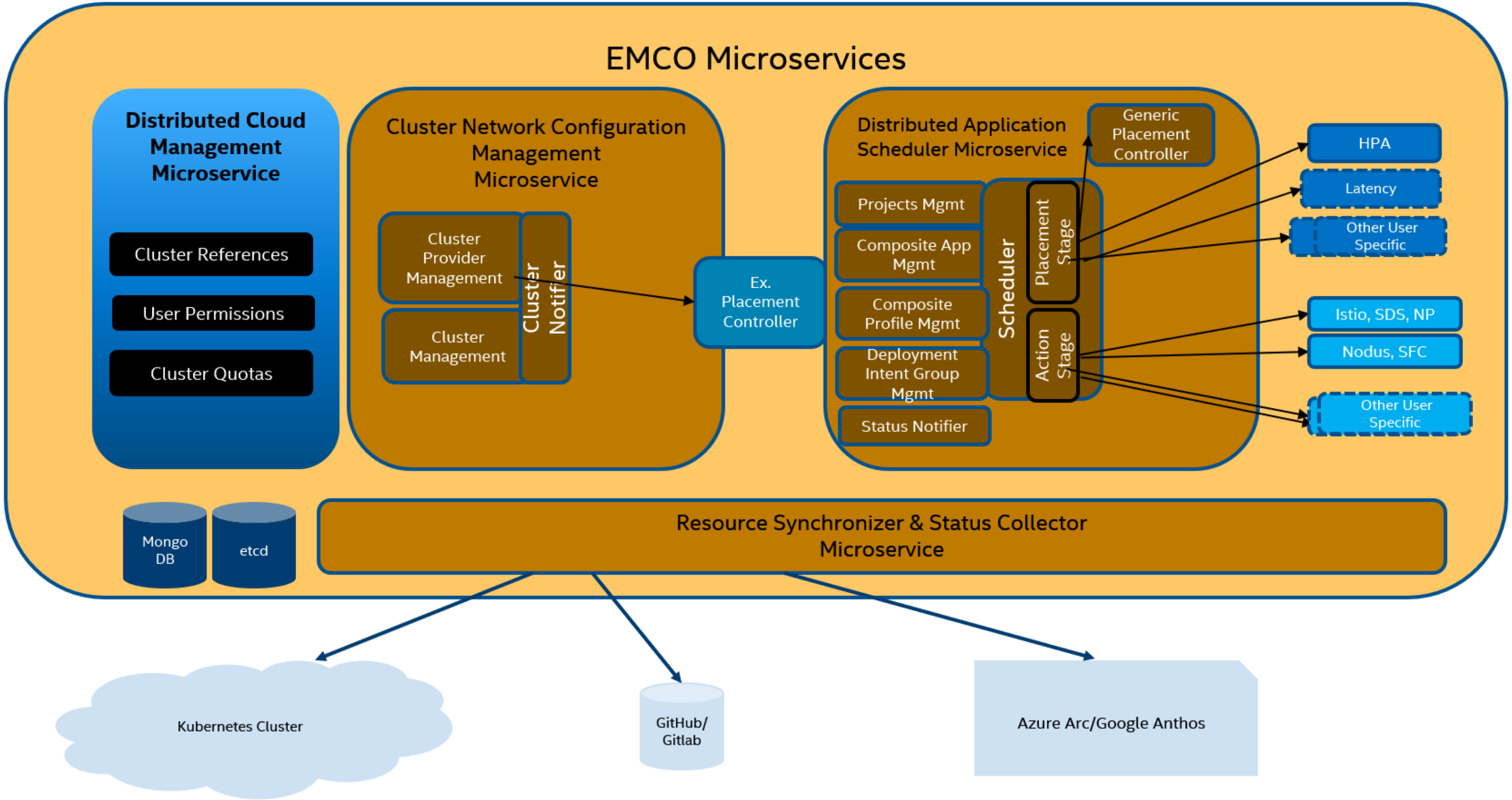
- **Distributed Cloud Manager** presents a single logical cloud from multiple edges

From the EMCO overview earlier

LF NETWORKING
LFN Developer & Testing Forum



From the EMCO overview earlier

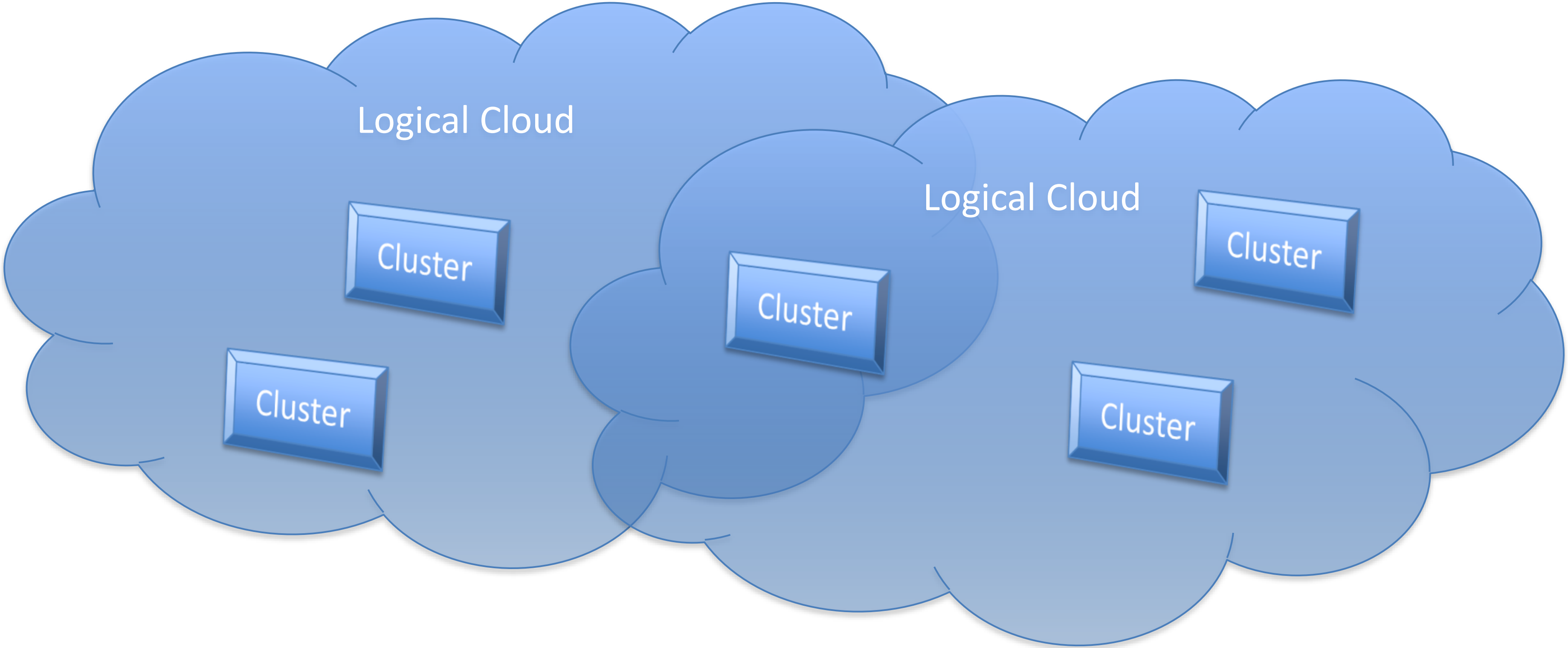


Distributed Cloud Manager (DCM)

- DCM provides:
  - The ability to instantiate Logical Clouds, *i.e.* clouds of clouds.

    (clouds spanning multiple clusters)

Logical Clouds



Distributed Cloud Manager (DCM)

- DCM is one of the key microservices in EMCO.
- Logical Clouds - collections of clusters.
  - Geographically disperse
- Multitenancy support.
- Abstraction layer for different Cluster APIs.

Main DCM API paths

- /projects/PROJECT/logical-clouds

- /projects/PROJECT/logical-clouds/LC/cluster-references
- /projects/PROJECT/logical-clouds/LC/cluster-references/CR/kubeconfig

- /projects/PROJECT/logical-clouds/LC/cluster-quotas

- /projects/PROJECT/logical-clouds/LC/user-permissions

- /projects/PROJECT/logical-clouds/LC/apply
- /projects/PROJECT/logical-clouds/LC/terminate

- /projects/PROJECT/logical-clouds/LC/status
- /projects/PROJECT/logical-clouds/LC/stop

Types of Logical Clouds

- Administrative
- Standard
- Privileged

Administrative Logical Cloud

- Directly connect the K8s* clusters using credentials provided by the cluster manager microservice.

- Essentially using the default namespace to deploy any resource/application (including additional namespaces).

** assumes K8s clusters*

Standard Logical Cloud

- Resources are installed in the K8s* clusters, starting with Namespace, to create a “partition” of the cluster (and between the clusters) to be used by EMCO.

- Limited applications can be deployed due to constrained access privileges.

** assumes K8s clusters*

Privileged Logical Cloud

- Structure-wise, same as a Standard Logical Cloud.
- However, access privileges are associated to the Logical Cloud (at the namespace and cluster levels), as well as towards other namespaces.
- This allows for a significantly wider range of applications that can be deployed.

** assumes K8s clusters*

Example of a Logical Cloud

```
metadata:
    name: permission1
spec:
    namespace: mynamespace
    apiGroups:
    - ""
    - "apps"
    - "k8splugin.io"
    resources:
    - secrets
    - pods
    - configmaps
    - services
    - deployments
    - resourcebundlestates
    verbs:
    - get
    - watch
    - list
    - create
    - delete
```

User Permission API resource

(defining this resource automatically promotes the Logical Cloud from **Standard** to **Privileged**)

Example of a Logical Cloud

```
metadata:
    name: myquota
spec:
    limits.cpu: '400'
    limits.memory: 1000Gi
    requests.cpu: '300'
    requests.memory: 900Gi
    requests.storage: 500Gi
    requests.ephemeral-storage: '500'
    limits.ephemeral-storage: '500'
    persistentvolumeclaims: '500'
    pods: '500'
    configmaps: '1000'
    replicationcontrollers: '500'
    resourcequotas: '500'
    services: '500'
    services.loadbalancers: '500'
    services.nodeports: '500'
    secrets: '500'
    count/replicationcontrollers: '500'
```

Cluster Quota API resource

Example of a Logical Cloud

```
metadata:
  name: lccluster1
spec:
  clusterProvider: cp1
  cluster: cp1-1
```

```
metadata:
  name: lccluster2
spec:
  clusterProvider: cp1
  cluster: cp1-2
```

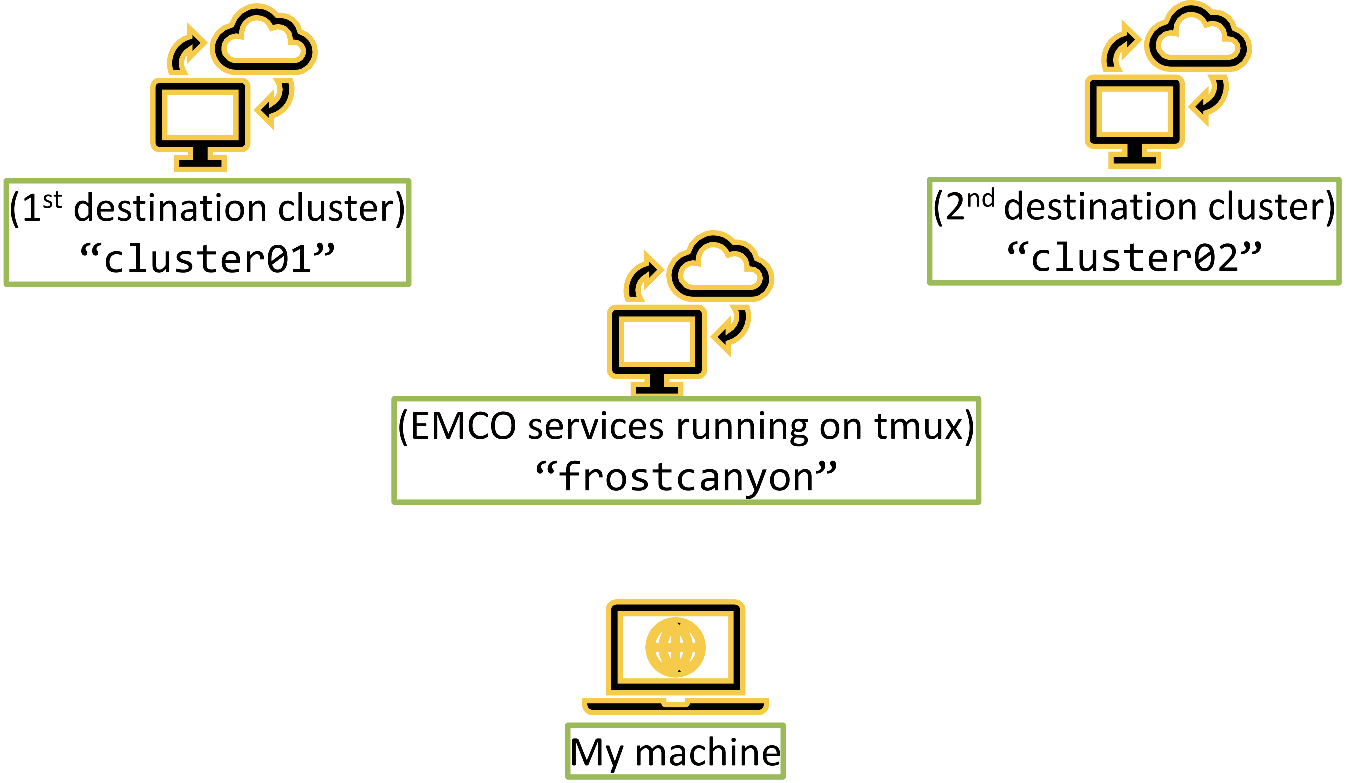
Cluster Reference API resource
(two of them)

Example of a Logical Cloud

```
metadata:
  name: myprivilegedcloud
spec:
  namespace: mynamespace
  labels:
    x: y
    team: dev
  user:
    userName: user-1
    type: certificate
```

Logical Cloud API resource

Demo environment



(1st destination cluster)
"cluster01"

(2nd destination cluster)
"cluster02"

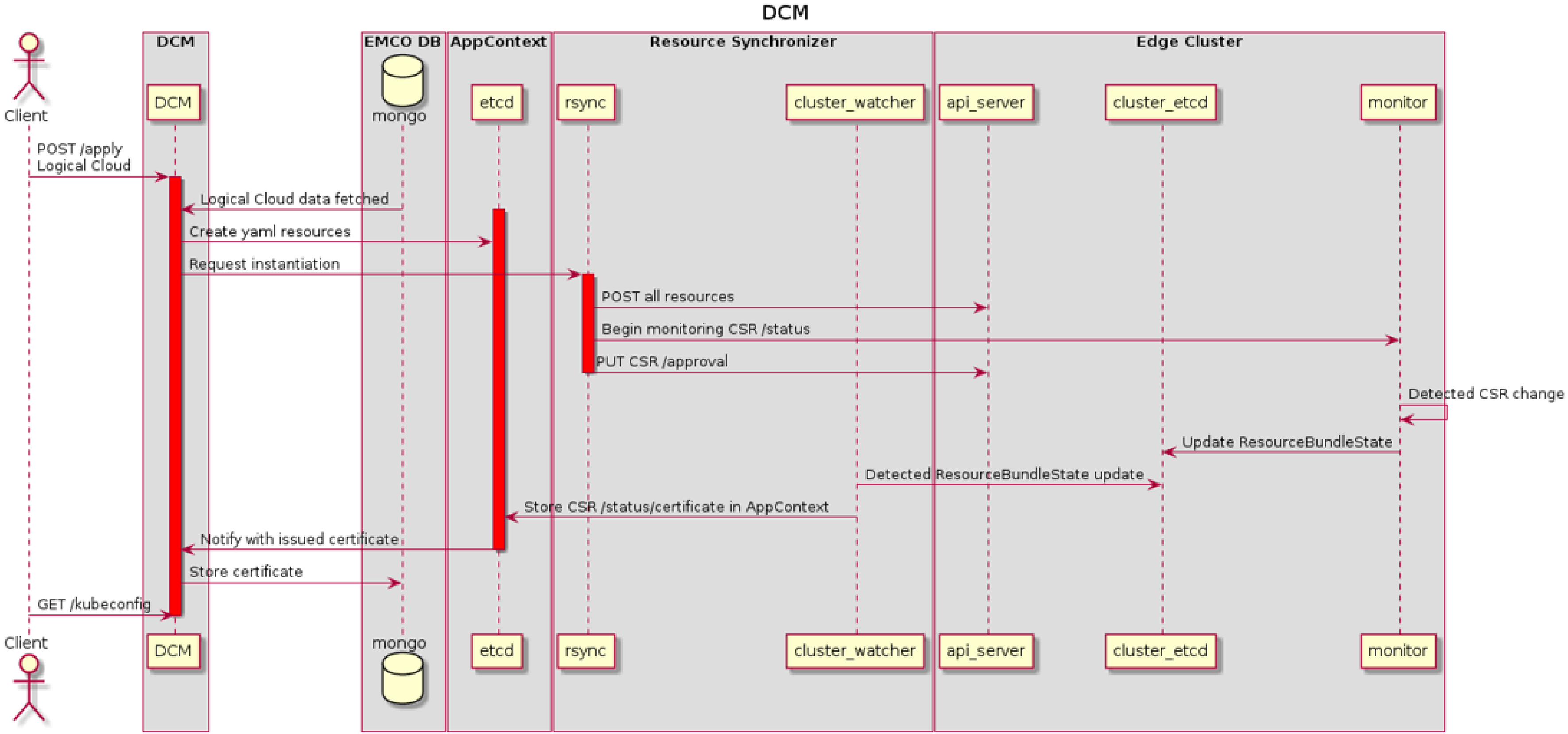
(EMCO services running on tmux)
"frostcanyon"

My machine

DEMO

<see recording>

CSR approval workflow



Future Work

(slide added after the session)

- Supporting more cluster backends (GitOps, etc.)
- Updating logical cloud details: add/remove cluster, permissions, quotas, etc.
- Up to full feature parity with using a K8s cluster directly (such as via kubectl).

Questions

<see recording>

Thank you!

- The EMCO development team at Intel ☺

https://project-emco.io/

https://gitlab.com/project-emco/core/emco-base

https://wiki.lfnetworking.org/display/EMCO/Welcome+to+the+EMCO+Wiki