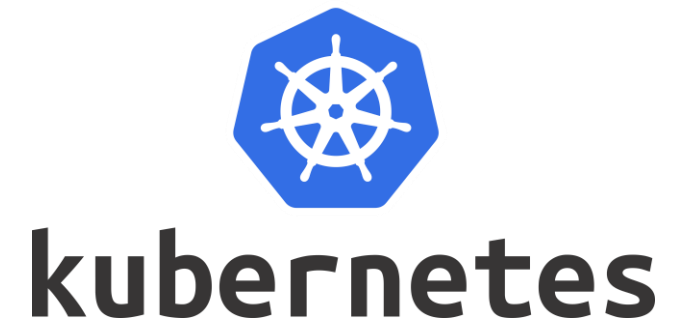# OSM#9 Hackfest – Day 2
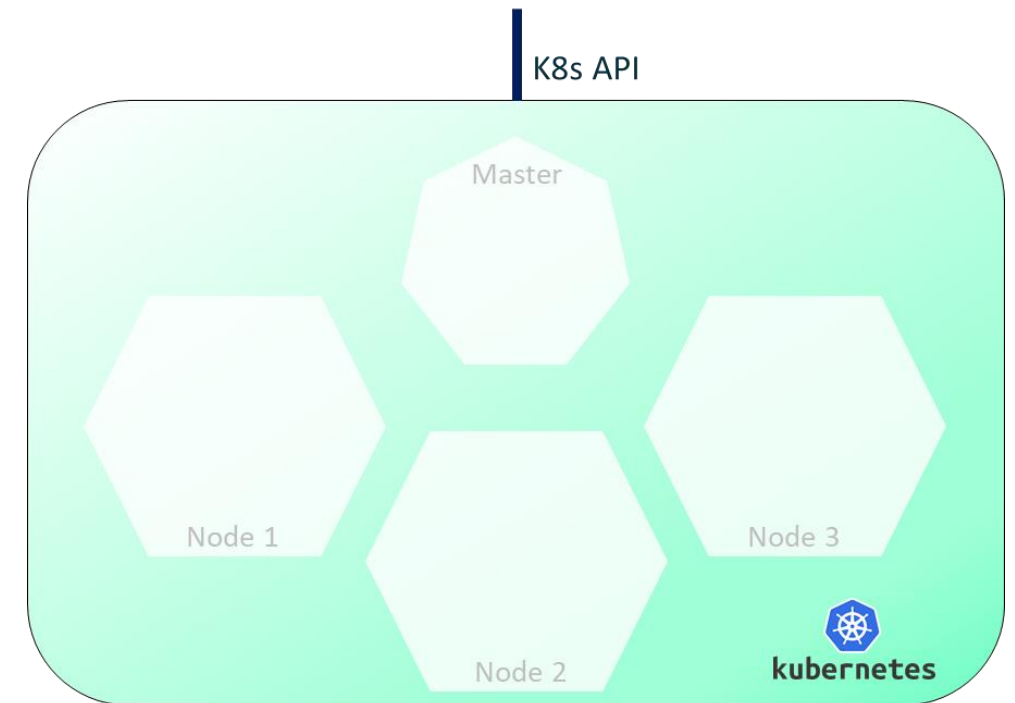# Part 1. K8s support in OSM

Gerardo García (Telefónica)

Why K8s in OSM?

- Applications based in micro-services
  - OSM is, in fact, already running in K8s, both [distros](#) and [community installer](#)

- Upcoming NFV use cases: 5G Core, uCPE/SD-WAN...

- K8s apps and clusters are essential ingredients for many Edge use cases

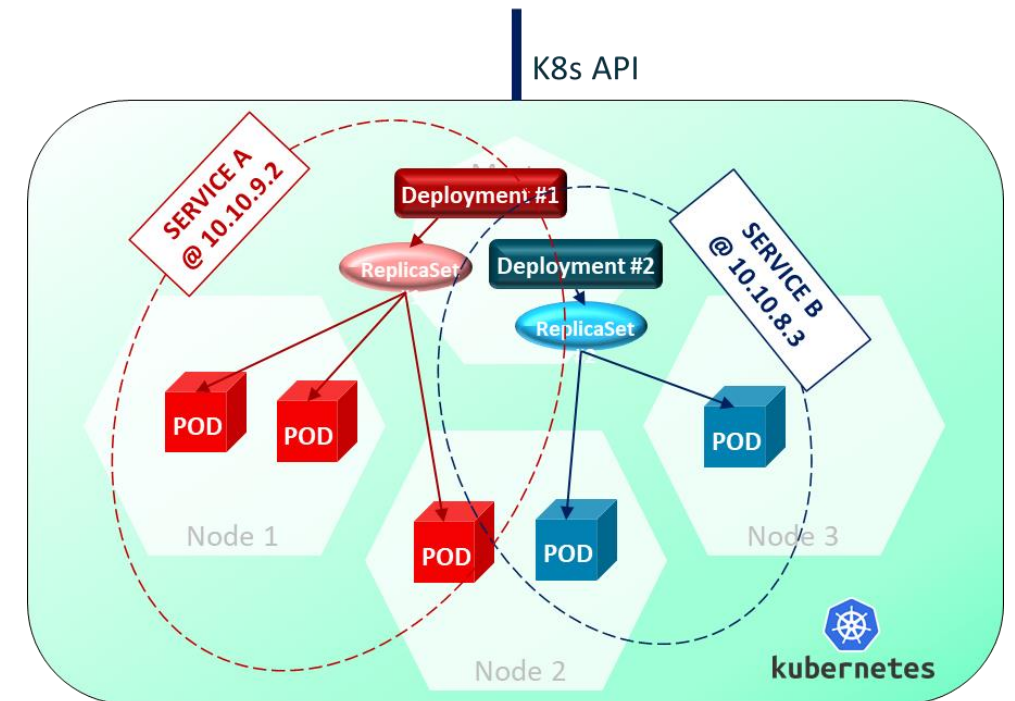# How K8s-based apps are modelled today

- K8s provides a huge number of high-level service objects, which are the core of its functionality:
  - Pod sets*: deployments (+replicasets), statefulsets
  - Services: clusterIP, NodePort, LoadBalancer
  - Storage: persistent volumes, persistent volume claims
  - …

- TWO ways to deploy a K8s app:
  - **Helm charts**: packaged format + indirect call to the K8s API via helm
  - **Juju charms and bundles**: packaged format + indirect call to the K8s API via Juju

(*) The concept "pod set" is not part of K8s terminology, but has been used here for convenience

K8s API

Master

Node 1

Node 2

Node 3

kubernetes

How K8s-based apps are modelled today

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Requirements of K8s-based apps: a K8s cluster

- **The K8s cluster:**
  - Can be created in different ways:
    - Standalone: Openshift, Charmed K8s, Ericsson CCD, etc.
    - As part of a VIM: Vmware Cloud PKS, AWS, etc.
  - Can run on Bare Metal or on VMs running in a VIM
  - Once created, each cluster provides a K8s API, irrespective of the way it was created.

- **Specific versions of K8s or CNI plugins might be required**
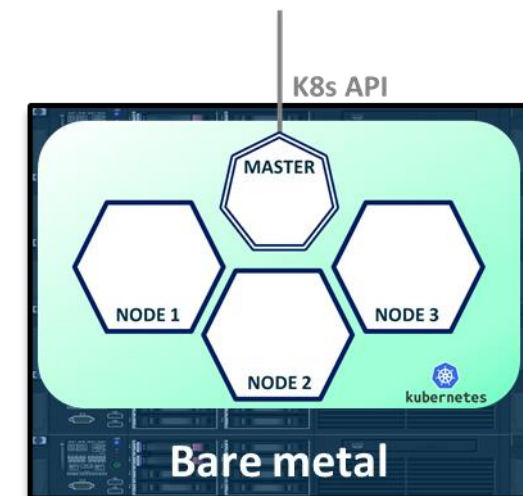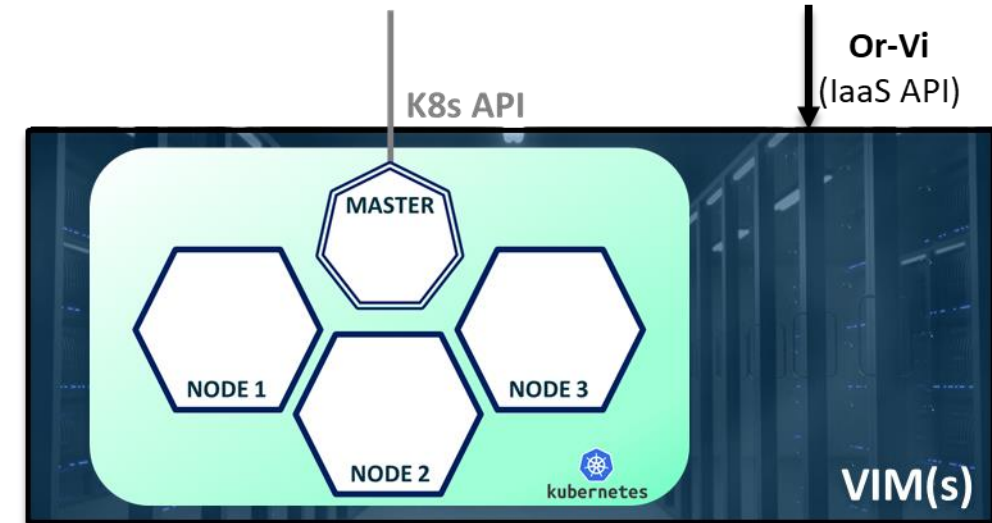
K8s support in OSM

From K8s apps to xNF
Model-driven (like everything in OSM)

- ## NF composition specified in the VNF descriptor
  - ### Deployment Units:
    - Virtual (VDU) = VM
    - Physical (PDU) = Physical Node
    - Kubernetes (KDU) = K8s app
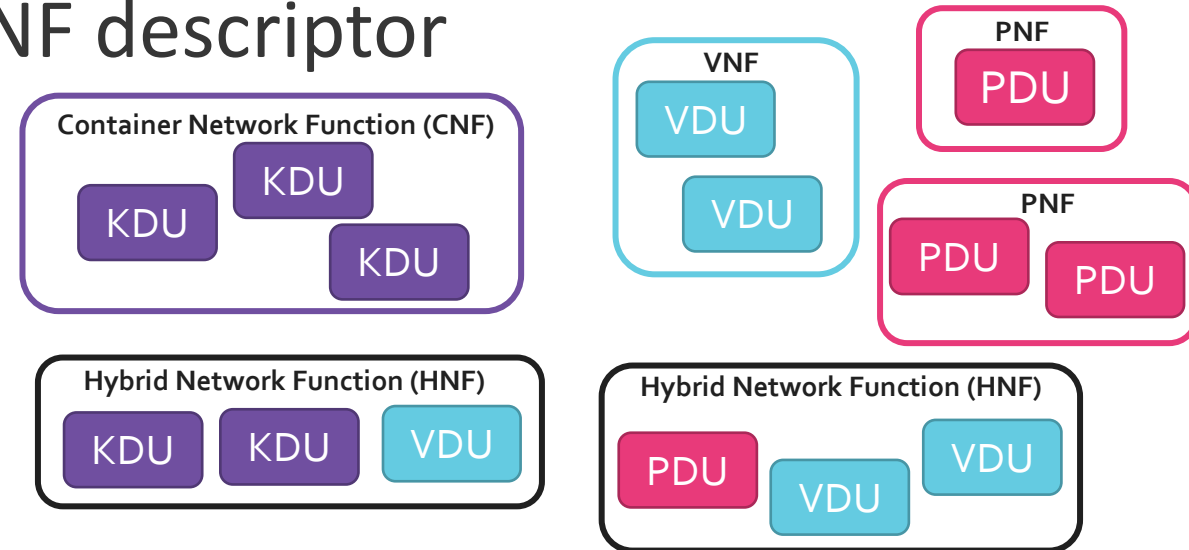
- ## Modelling in the VNF descriptor:
  - KDU based on helm charts or juju bundles


```
+--ro kdu* [name]
|  +--ro name              string
|  +--ro description?       string
|  +--ro (kdu-model)?
|  |  +--:(helm-chart)
|  |  |  +--ro helm-chart?    string
|  |  +--:(juju-bundle)
|  |     +--ro juju-bundle?   string
```

  - K8s cluster requirements:

```
+--rw k8s-cluster
|  +--rw version*    string
|  +--rw cni*        enumeration
|  +--rw nets* [id]
|     +--rw id                          string
|     +--rw external-connection-point-ref?   -> ../../../connection-point/name
```

Two steps are considered in OSM

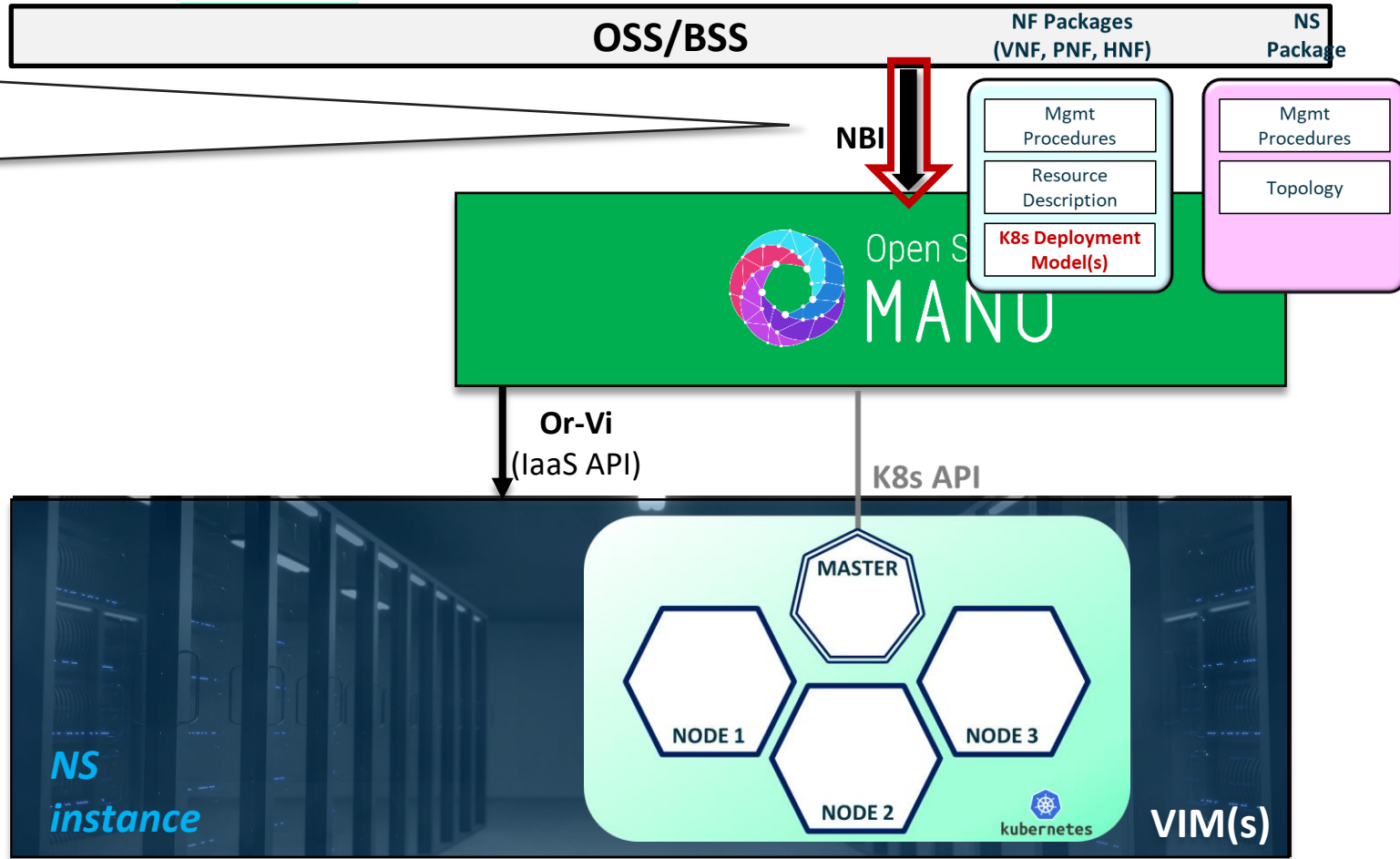| STEP #1. CREATION OF THE K8S CLUSTER	STEP #2. USE OF THE K8S CLUSTER

OPTIONS:
 	
1. **By an external platform, static**
   • Cluster is then registered into OSM administratively
2. **By using external standalone platform API**
   • Covered by plugin model (Rel EIGHT)
3. **By using "enriched" APIs in some VIMs**
   • Covered by plugin model (Rel EIGHT)
4. **Created by OSM as a regular NS**
	• **The full catalog of K8s objects is entirely incorporated in a future-proof manner**:
	
	   • **Helm charts**: +20,000 stable applications are already available for production
	   • **Juju bundles**: fairly powerful for inter-object configurations
	
	• OSM also supports **hybrid cases**, which are required for real VNFs (e.g. 5G Core)
	
	NF Packages (VNF, PNF, HNF)
	Mgmt Procedures
	Resource Description
	K8s Deployment Model(s)
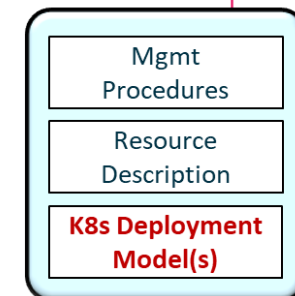	
	Ready in Release SEVEN!

Life cycle management of KDU is managed through OSM NBI

Full K8s app lifecycle operations:
- `install`
- `upgrade`
- `rollback`
- `delete`

OSS/BSS

NF Packages (VNF, PNF, HNF)

NS Package

NBI

Mgmt Procedures

Resource Description

K8s Deployment Model(s)

Mgmt Procedures

Topology

Open Source MANU

Or-Vi (IaaS API)

K8s API

NS instance

MASTER

NODE 1

NODE 2

NODE 3

kubernetes

VIM(s)

Cluster creation using OSM packages

How to install a K8s cluster

You can follow this guide:
https://osm.etsi.org/docs/user-guide/15-k8s-installation.html

How to install a K8s cluster using OSM packages

```
osm nfpkg-create k8s_jujumachine_vnf.tar.gz
osm nfpkg-create k8s_jujucontroller_vnf.tar.gz
osm nspkg-create k8s_juju_ns.tar.gz
osm ns-create --ns_name k8s-cluster \
              --nsd_name k8s_juju \
              --vim_account <VIM_ID> \
              --config_file config.yaml \
              --ssh_keys ${HOME}/.ssh/id_rsa.pub
```

How to install a K8s cluster using OSM packages
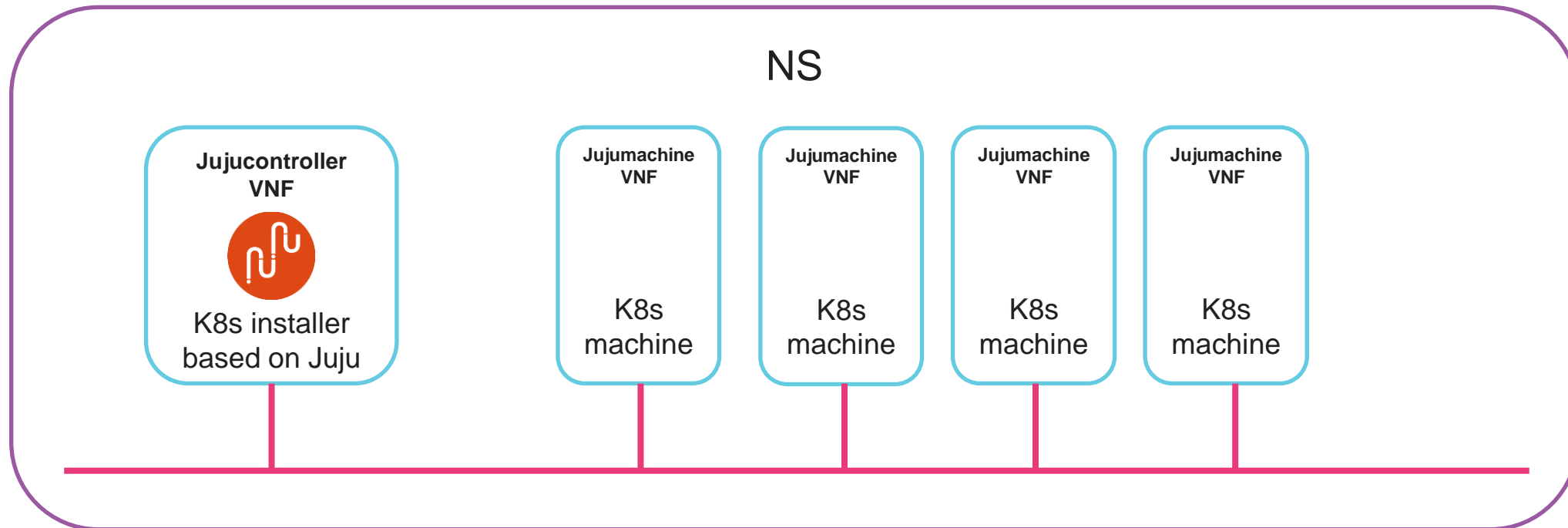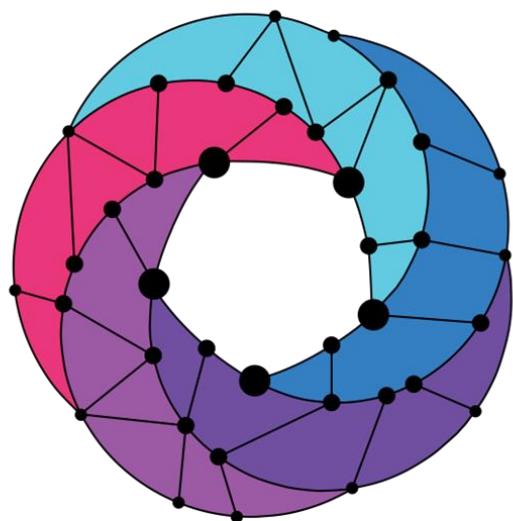
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