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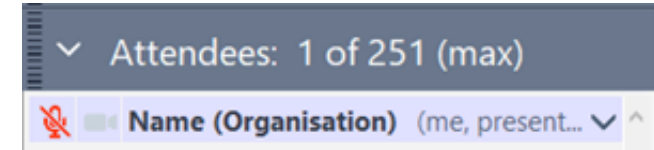
OSM-MR#9 Hackfest – Day 2

Agenda for today (CET)

10am	
11am	11am HD2.1 K8s support in OSM (Gerardo)
	11:30am HD2.2 Orchestrating CNFs in K8s (Gerardo)
12pm	
1pm	
2pm	2pm HD2.3 Intro to OSM Primitives (David)
	2:30pm HD2.4 OSM Primitives for VNFs (I) (David)
3pm	
4pm	
	4:30pm HD 2.5 Intro to Juju Relations (David)
5pm	5pm HD2.6 OSM Primitives for VNFs (II) (David)
6pm	

Recap on the logistics and way of working

- Join us every day on **G2M**
 - <https://www.gotomeet.me/OSMhackfest>
 - Please enter your **name & email**
 - Use a **headset** and **mute** yourself during the sessions
 - Sessions are being recorded and will be posted on YouTube
- Ask questions any time on [Slack](#) **#hackfests** channel
 - Please create a dedicated thread for each issue
- Slides are made available in the [wiki](#)
- Resources spreadsheet can be found in this [link](#)



- You can follow Open Source MANO and this hackfest on:
 - <https://twitter.com/OpenSourceMANO>
 - <https://www.linkedin.com/company/open-source-mano>
 - <https://www.youtube.com/c/OpenSourceMANO>
- Share your thoughts, impressions, pictures or screenshots on social media, blog posts...
 - Mentions are welcome!



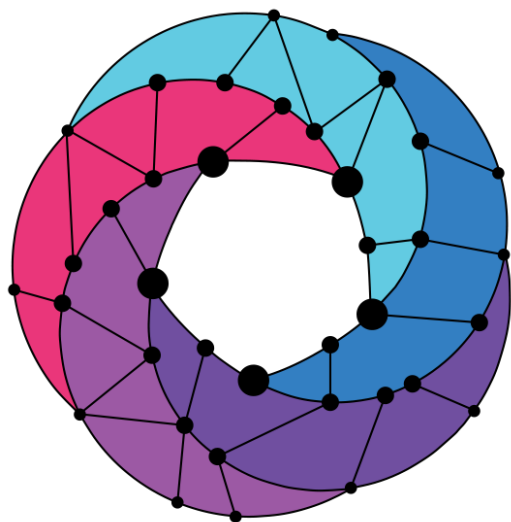
@OpenSourceMANO #OSMMR9hackfest

Warning

- If you are an advanced user or you are reading this presentation in advance...



PLEASE DO NOT DEPLOY
A KUBERNETES CLUSTER IN THE VIM!
(WE WILL USE AN EXISTING ONE)



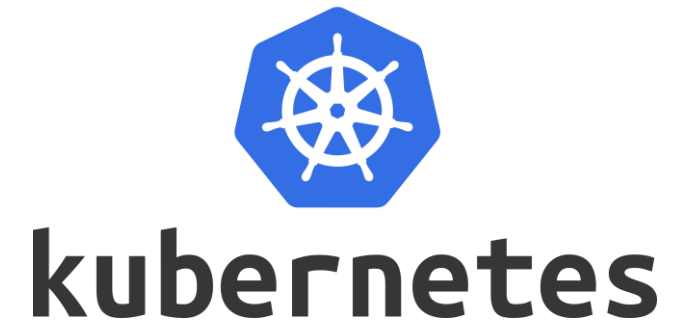
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OSM-MR#9 Hackfest – Day 2 Session 1. K8s support in OSM

Gerardo García (Telefónica)

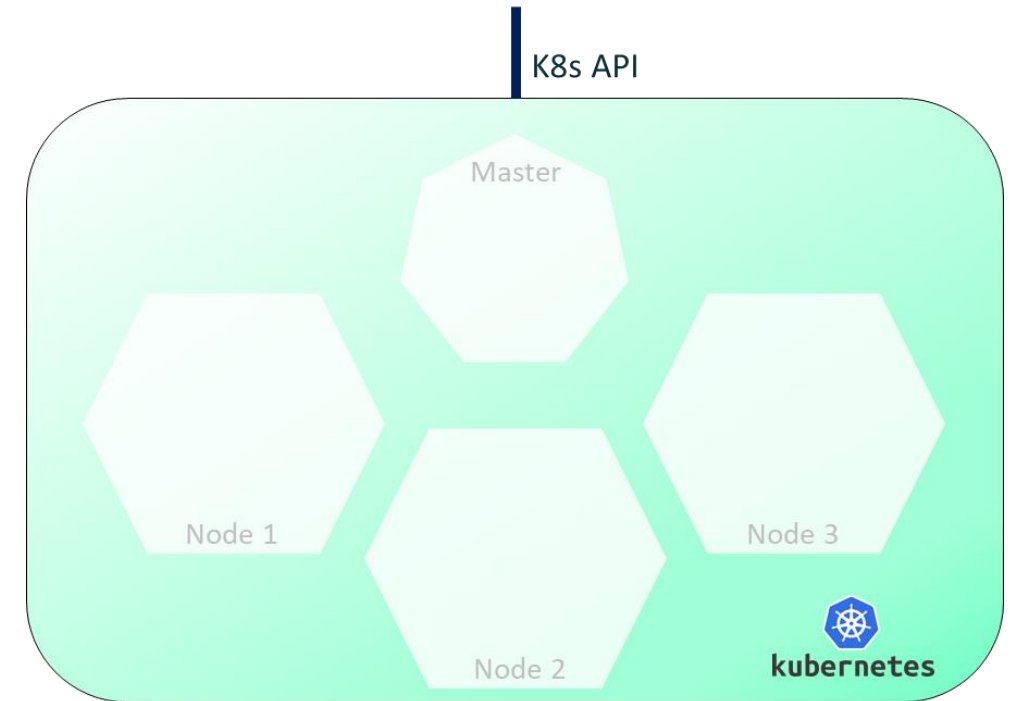
Why K8s in OSM?

- 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

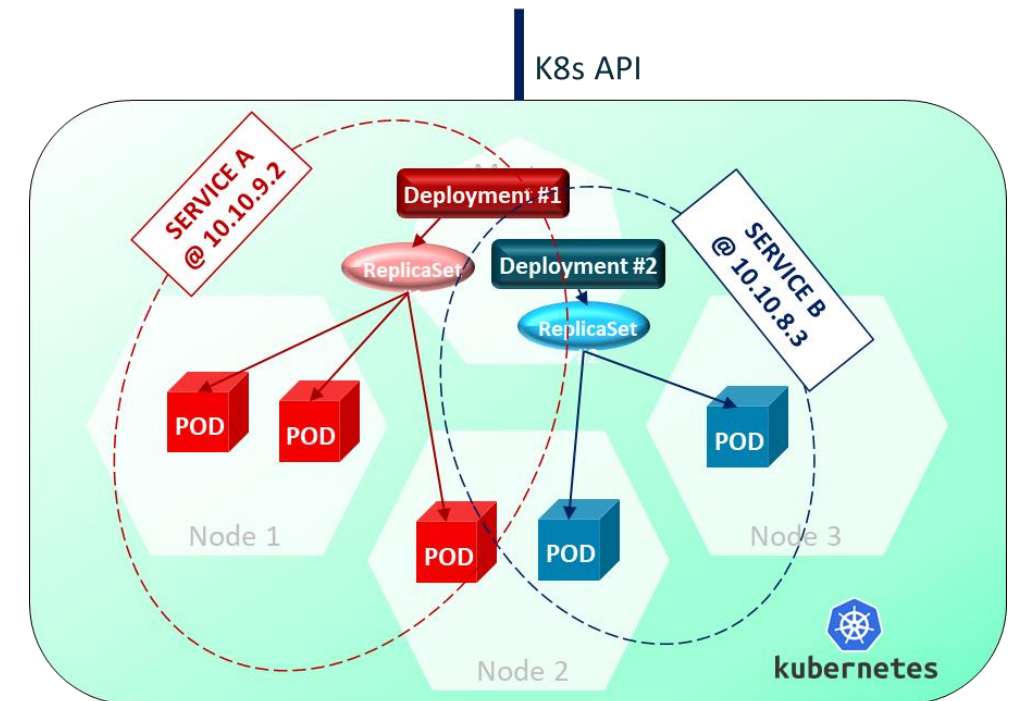
- K8s provides a huge number of high-level service objects, which are the core of its functionality:
 - Pod sets*: deployments (+replicasets), statefulsets
 - Services: clusterIP, NodePort, LoadBalancer
 - Storage: persistent volumes, persistent volume claims
 - ...
- TWO ways to deploy a K8s app:
 -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

How K8s-based apps are modelled today

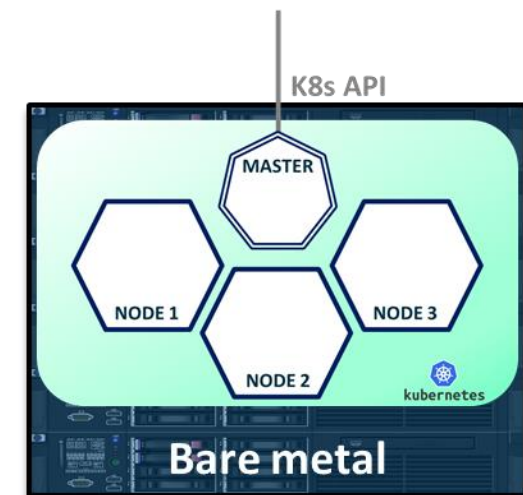
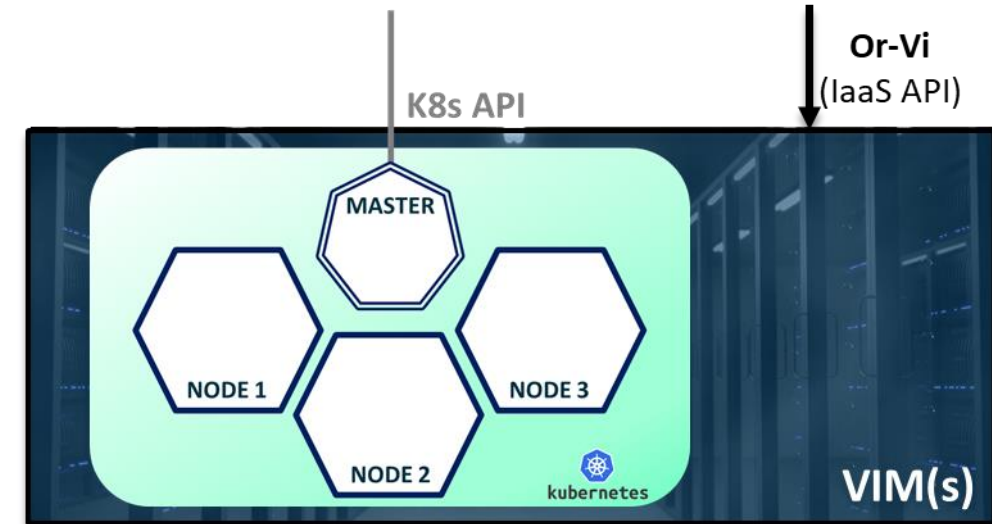
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Requirements of K8s-based apps: a K8s cluster

- 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





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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**

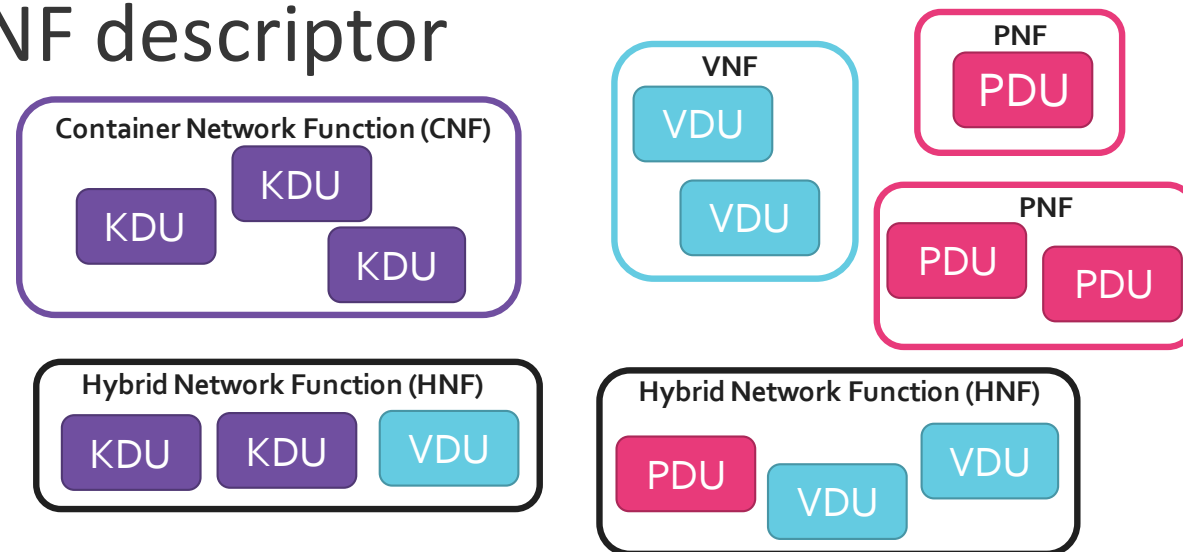
- Modelling in the VNF descriptor:

- 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

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**

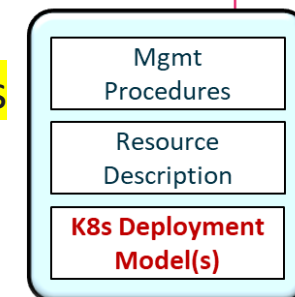
STEP #2. USE OF THE K8S CLUSTER

- **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)



Ready since Release SEVEN!

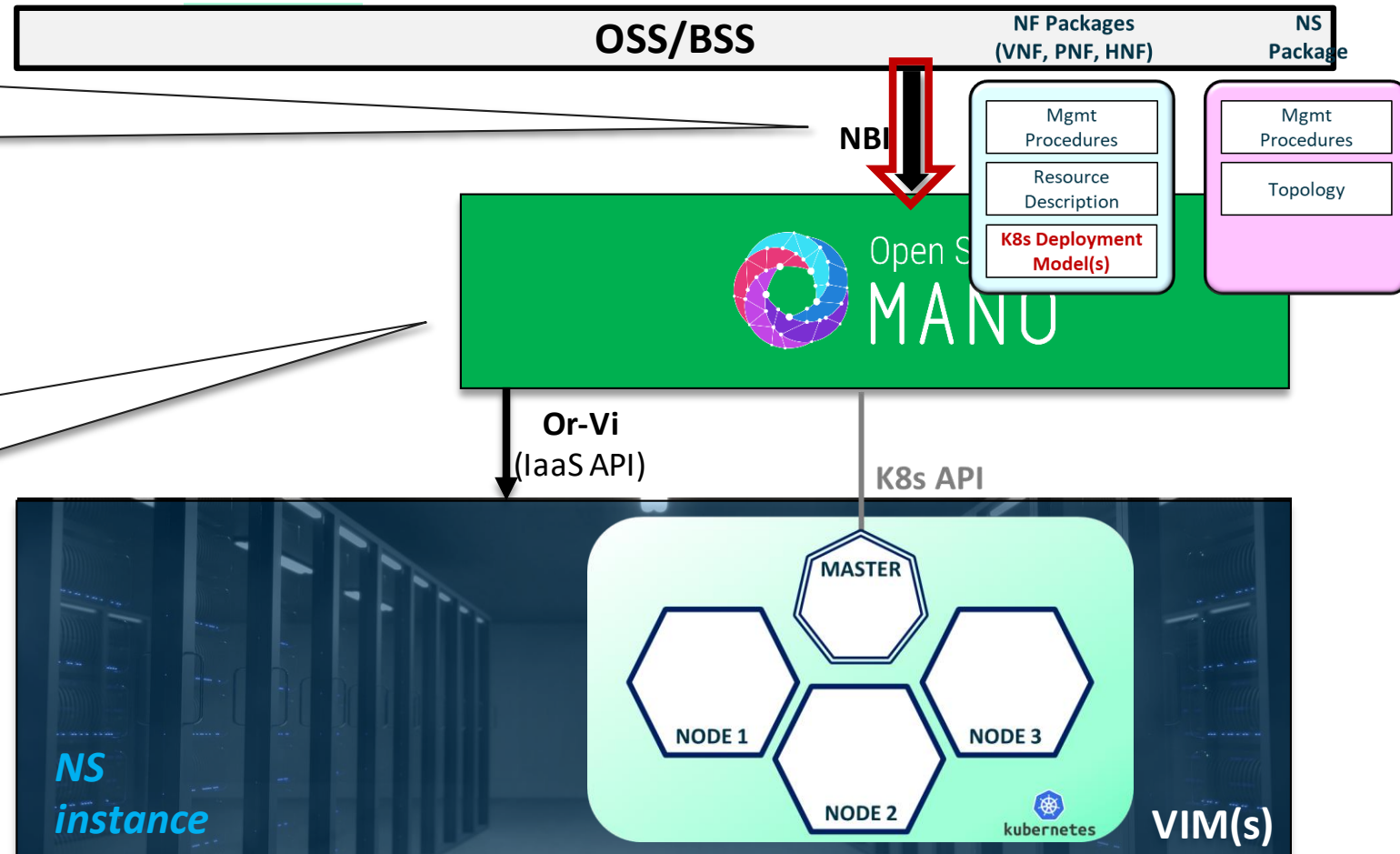
OSM NBI abstracts the operations required to manage the life cycle of KDU in the context of a NS

OSM operations:

- NS instantiate
- NS primitive
- NS termination

Full K8s app lifecycle operations:

- install
- upgrade
- rollback
- delete





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How to create a K8s cluster

Cluster creation using OSM packages



Friendly reminder

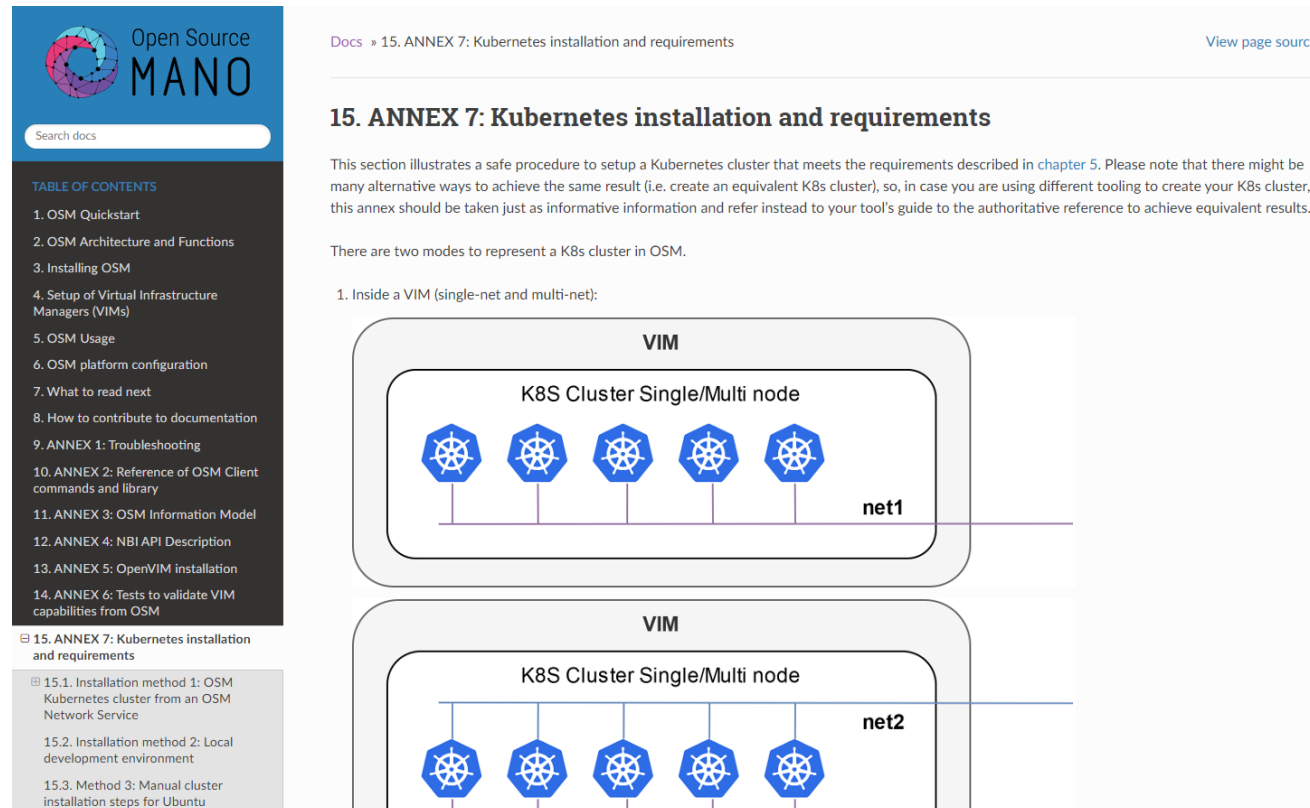


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How to install a K8s cluster

You can follow this guide:

<https://osm.etsi.org/docs/user-guide/15-k8s-installation.html>



The screenshot shows the Open Source MANO documentation interface. On the left is a sidebar with a search bar and a table of contents. The main content area displays the title '15. ANNEX 7: Kubernetes installation and requirements' and a brief introduction. Below the text is a diagram illustrating two deployment modes for a K8s cluster within a VIM. The top diagram, labeled 'net1', shows a 'K8S Cluster Single/Multi node' with five Kubernetes icons connected to a single network line. The bottom diagram, labeled 'net2', shows a similar cluster connected to a separate network line. The sidebar table of contents lists various sections, with '15. ANNEX 7: Kubernetes installation and requirements' expanded to show sub-sections 15.1, 15.2, and 15.3.

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Search docs

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- 1. OSM Quickstart
- 2. OSM Architecture and Functions
- 3. Installing OSM
- 4. Setup of Virtual Infrastructure Managers (VIMs)
- 5. OSM Usage
- 6. OSM platform configuration
- 7. What to read next
- 8. How to contribute to documentation
- 9. ANNEX 1: Troubleshooting
- 10. ANNEX 2: Reference of OSM Client commands and library
- 11. ANNEX 3: OSM Information Model
- 12. ANNEX 4: NBI API Description
- 13. ANNEX 5: OpenVIM installation
- 14. ANNEX 6: Tests to validate VIM capabilities from OSM
- 15. ANNEX 7: Kubernetes installation and requirements
 - 15.1. Installation method 1: OSM Kubernetes cluster from an OSM Network Service
 - 15.2. Installation method 2: Local development environment
 - 15.3. Method 3: Manual cluster installation steps for Ubuntu

Docs » 15. ANNEX 7: Kubernetes installation and requirements

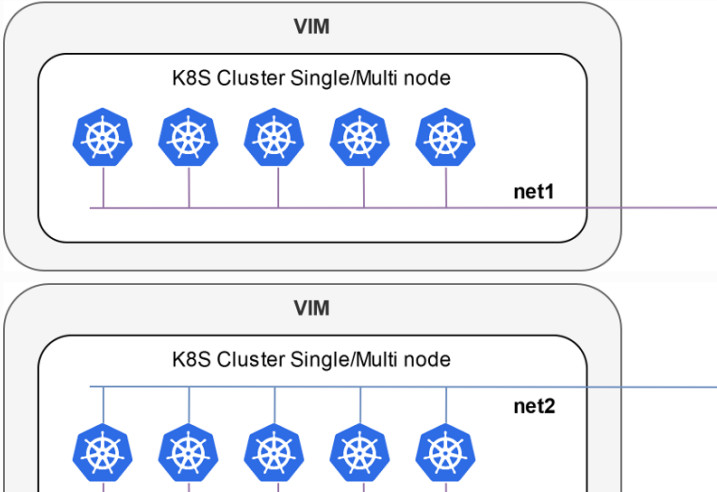
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15. ANNEX 7: Kubernetes installation and requirements

This section illustrates a safe procedure to setup a Kubernetes cluster that meets the requirements described in chapter 5. Please note that there might be many alternative ways to achieve the same result (i.e. create an equivalent K8s cluster), so, in case you are using different tooling to create your K8s cluster, this annex should be taken just as informative information and refer instead to your tool's guide to the authoritative reference to achieve equivalent results.

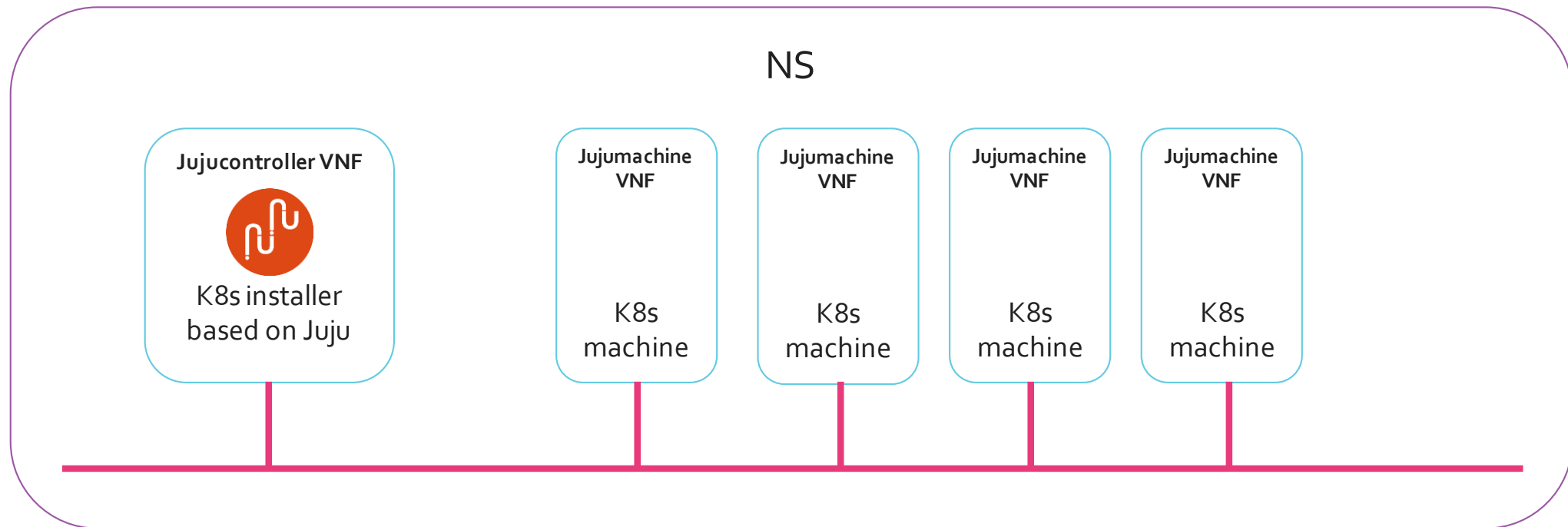
There are two modes to represent a K8s cluster in OSM.

1. Inside a VIM (single-net and multi-net):



The diagram illustrates two Virtual Infrastructure Managers (VIMs) stacked vertically. Each VIM contains a 'K8S Cluster Single/Multi node' represented by a rounded rectangle. Inside each cluster rectangle, five Kubernetes icons (blue circles with white ship's wheels) are arranged horizontally and connected to a single horizontal line. The top cluster is connected to a line labeled 'net1', and the bottom cluster is connected to a line labeled 'net2'. The entire diagram is enclosed in a light gray border.

How to install a K8s cluster using OSM packages



How to install a K8s cluster using OSM packages

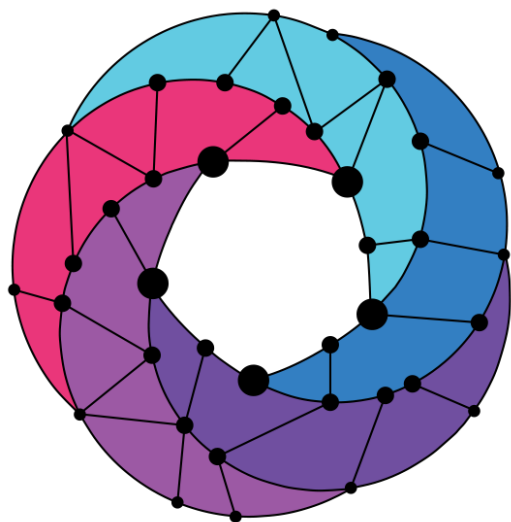
```
osm nfpkg-create k8s_jujumachine_vnf.tar.gz
osm nfpkg-create k8s_jujucontroller_vnf.tar.gz
osm nspkg-create k8s_juju_ns.tar.gz
osm ns-create --ns_name k8s-cluster \
              --nsd_name k8s_juju \
              --vim_account <VIM_ID> \
              --config_file config.yaml \
              --ssh_keys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

Final warning!



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THE VIM!**

**(WE WILL USE AN EXISTING
ONE)**



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osm.etsi.org
osm.etsi.org/docs
osm.etsi.org/wikipub