Let’s Move Everything to Kubernetes!

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Poll

Is it a good idea to deploy <u>all</u> our network functions on Kubernetes?

1. No
2. It’s appropriate for a subset of use cases (edge?)
3. ?
4. Maybe later; for now let’s focus on OpenStack
5. YES!

Part 1
Why Kubernetes?

We’ve been doing it wrong

Lifecycle management is the enemy:

- Complex workflow (otherwise we wouldn’t have to “manage” it)
- Must keep track of state of many and diverse resources
- (*A lot* of state: logs, timings, databases, queues)
- When things go wrong the system is left in indeterminate state
- (Things go wrong *a lot*; clouds are expected to be unreliable)
- Complexity of automation reflects the complexity of the lifecycle
- So, now we have *even more* things that can go wrong

Paradigm shift (or: back to basics)

- “Scheduling” is intent-based
- “Life” has no “cycle”—it’s just a binary, either scheduled or not
- And so LCM is an implementation detail (wait for next slide)
- Also: containers are an implementation detail (we deal with “pods”)

“Legacy” orchestration has the wrong metaphor: it’s actually more like puppeteering than conducting an orchestra (tangle of strings)

In Kubernetes we are finally truly orchestrating (back to basics) where every part of the orchestra knows its music

What happened to LCM?

Two things:

1. It’s hardcoded:
    a. “container” image is loaded
    b. network is assigned
    c. configs are mapped
    d. entry point is called
2. Welcome to cloud native! Application will initialize itself

   We used to call this Inversion of Control (IoC)

Bottom line: LCM is not the orchestrator’s problem anymore

The Evolution of “Containers”

Prehistory	Lightweight VMs	Microservices	Service Mesh
chroot/cages	Docker	Kubernetes	Istio
Monit	Mesos	OpenShift	Linkerd
supervisord	LXD	Marathon	Conduit
OSGi			(Hystrix, Finagle)

portability

isolation

orchestration

composition

Part 2
Instead of OpenStack?!

Have your cake and eat it

I know what you're going to say:

Kubernetes seems great, but CNFs don't really exist yet

But ...

We *can* fully support "legacy" VNFs on Kubernetes

And we *should* because reducing LCM is a big win

(We're talking network functions; rest of data center can be whatever)

Kubernetes Network Function Extension

KNFE (pronounced “knife”)

Off-the-shelf:

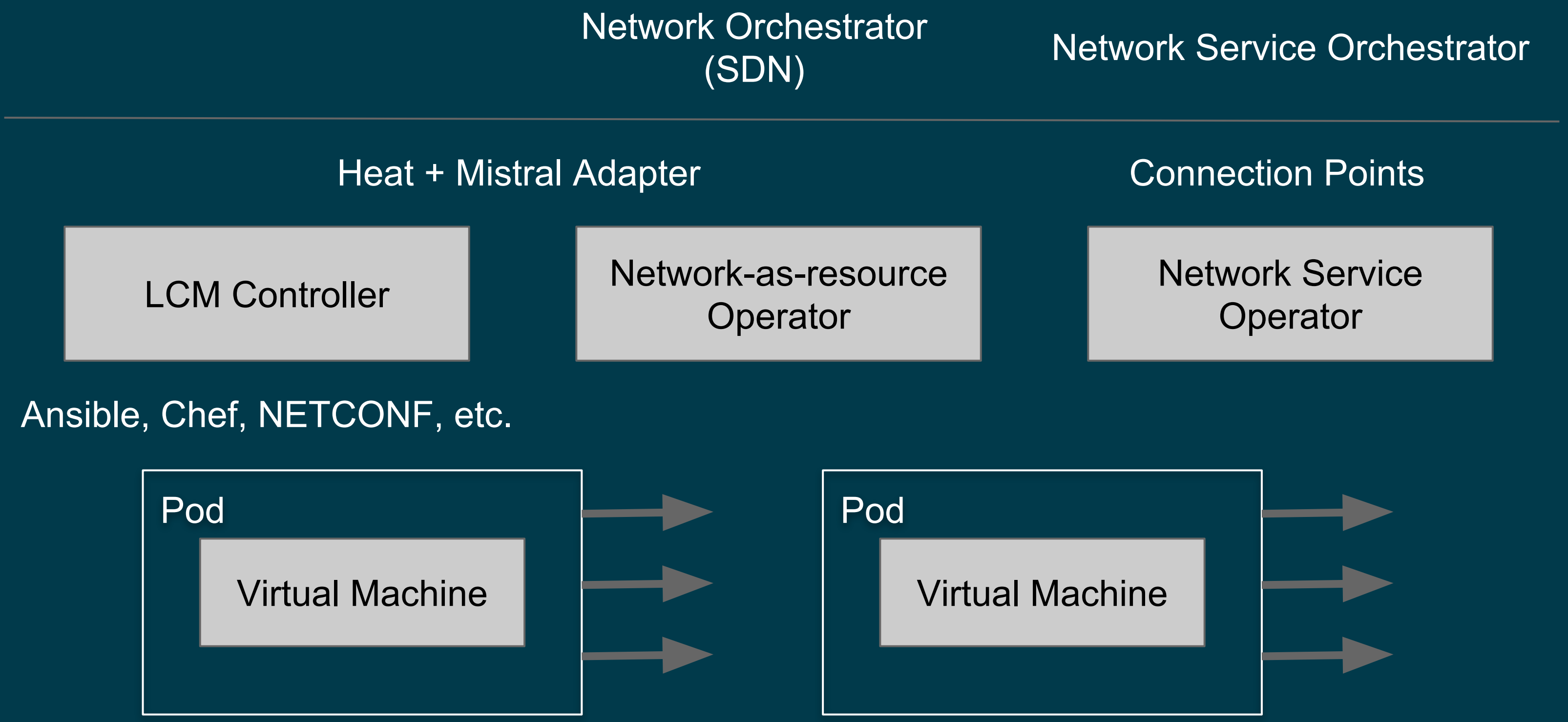
- Kubernetes (production-ready distributions, like OpenShift)
- KubeVirt (the “V” in “VNF”)
- Multus (and maybe Network Service Mesh)
- Cluster API

Missing:

- LCM controller for VNFs
- Network-as-resource operator
- Network service operator

(All the above should be cloud-native, almost stateless, tiny)

KNFE Runtime Architecture



(P.S. All of this can be modeled in TOSCA)

Part 3
What About ONAP?

KNFE and ONAP

Manager ("NFV-O"):

SO, SDC, A&AI, SDN-C, DCAE, some S-VNFM

Embedded in infrastructure ("NFV-I"):

- Kubernetes = VIM + Multi-Cloud
- KNFE = G-VNFM + VF-C + App-C
- Custom operators = some S-VNFM

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