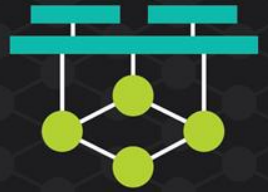

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Who says You Shouldn't Run VMs and Containers Together?

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Glenn Seiler Wind River

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Agenda

- Making the Case for Both VMs and Containers
- State of Container Usage in Telco today
- Options for running VMs and Containers
- An example: StarlingX – Distributed Edge Cloud

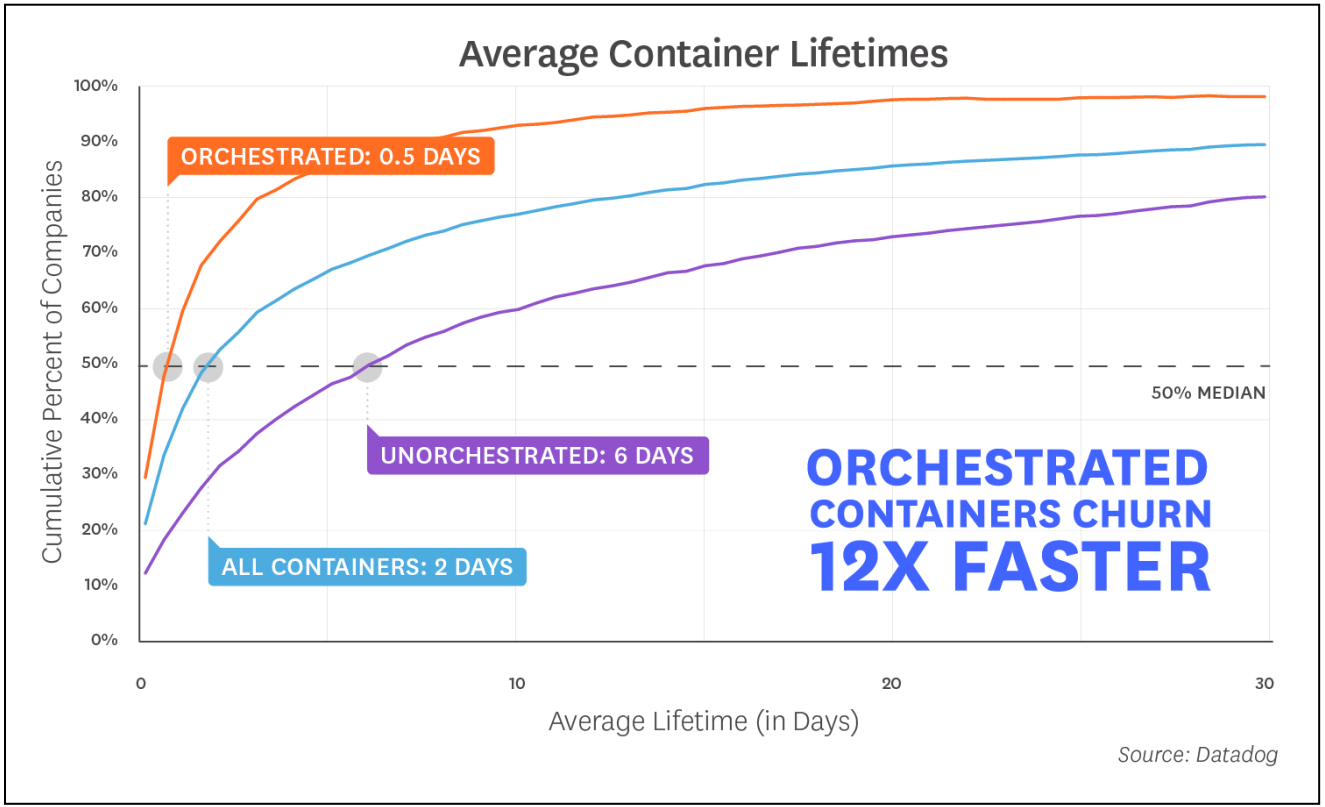
Ok, We All Know Containers ‘Rule the Edge’

- Best where low latency, resiliency, and portability are extremely important
- Run the maximum amount of particular applications on a minimum of servers
- Containers are useful for deploying short-lived and ephemeral services
- Models and applications where a problem can be divided into small sets of tasks

But There is A Management Issue with Containers

An order-of-magnitude increase in the number of components that must be managed and monitored

Too many ‘services’ increases mgmt overhead



So When Do We Want to Run VMs (or VNFs)

- Running multiple applications on servers and/or have a wide variety of operating systems
- If state is required
- Networking and performance accelerators such as CPU Pinning, NUMA, DPDK, SR-IOV
- Don’t need to update or replace the workload often
- Workloads that need to look at every single packet; including service chaining
- A tighter security model than what is available for containers today

“82% of respondents indicated they are deploying or plan to execute VNFs on uCPE located at customer sites”

Michael Howard IHS Markit

Some Facts About Container Adoption in Telco

- Multi-tenant servers represented 62% of total servers in 2018 survey
- Telcos and enterprises run containers in only 5% of their multi-tenant servers
- 16% of multitenant telco servers will have a container-OS in 2022
- Hypervisors running virtual machines that contain a container OS accounted for 18% hypervisors deployed

Source: 2018 Multi-Tenant Server Software Market Tracker


option 1
option 2
option 3
option 4

#1: “Containers in a VM” Hybrid Architecture

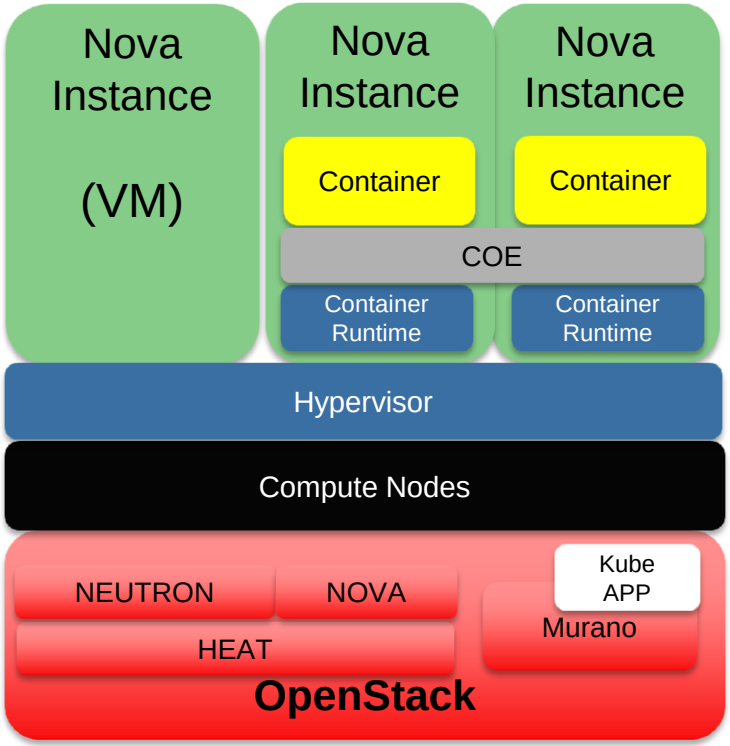
Containers are hosted by VMs

PROS:

- Supports COEs and Containers
- Maintains “Pet” approach for critical VMs including containers in a VM
  - Live migration, monitoring & fault recovery
  - Scaling of and load balancing across hosts

CONS:

- Heavyweight at the edge
- Complex; lot of moving parts

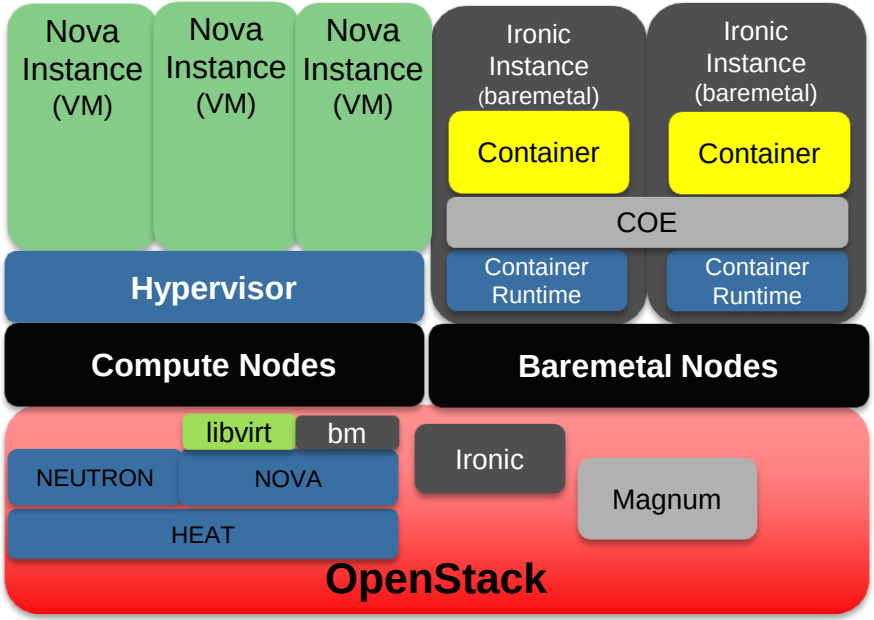


#2: Bare metal Containers in a VM Hybrid Architecture

Provides a bare metal environment within OpenStack (with Ironic)

PROS:

- Flexible, proven method
- Containers running Natively; No Hypervisor
- Containers managed by COE
- Maintain VM/OpenStack Investment



CONS:

- Complex
- Heavy control plane for Edge
- Can't extend some benefits of VMs to containers

#3: Kata Containers architecture

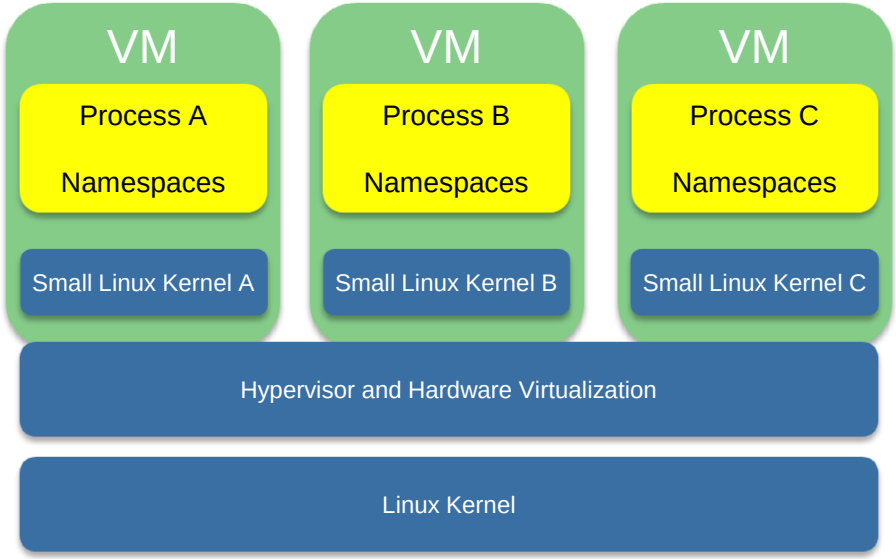
Provides a bare metal environment within (OpenStack) VMs

PROS:

- Increased isolation
- Managed by Kubernetes
- Behaves like a container

CONS:

- Consumes more resources



#4: Bare Metal Containers with Openstack/VMs

Containerize OpenStack

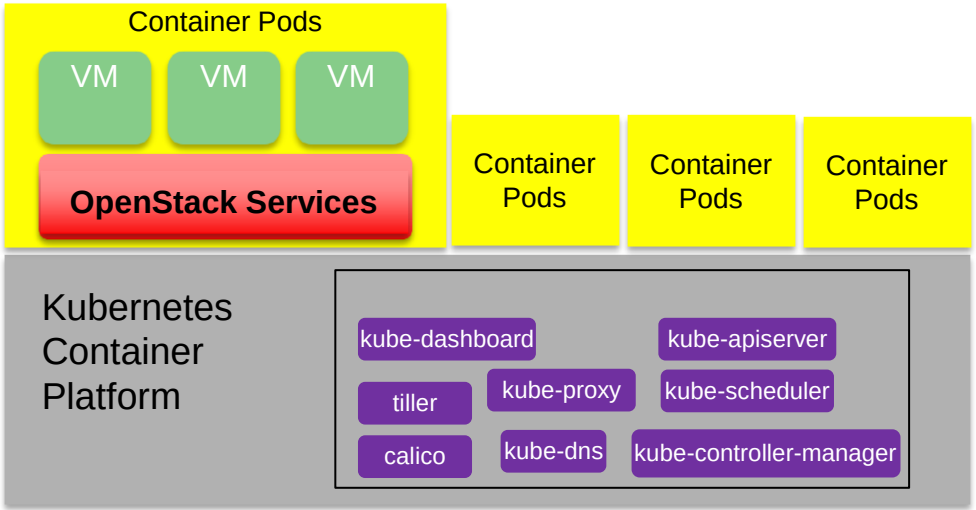
- On top of a bare metal Kubernetes cluster
- Kubernetes manages the lifecycle of the containerized OpenStack application

VMs and Containers managed the same through Kubernetes and treated as equal citizens

Only run OpenStack (in a container) when needed for VMs

Kubernetes cluster available for non-OpenStack end user applications

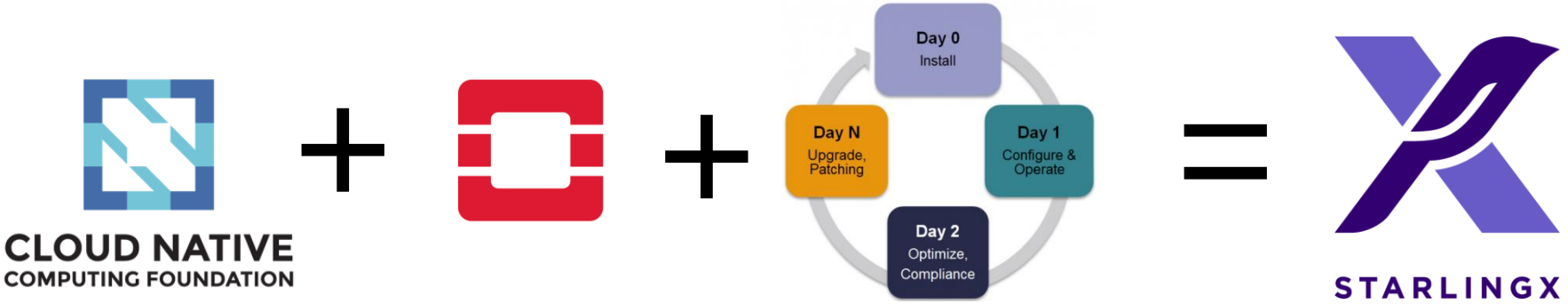
Lighter weight approach to deploying containers



An Example: StarlingX; a Container and VM Solution

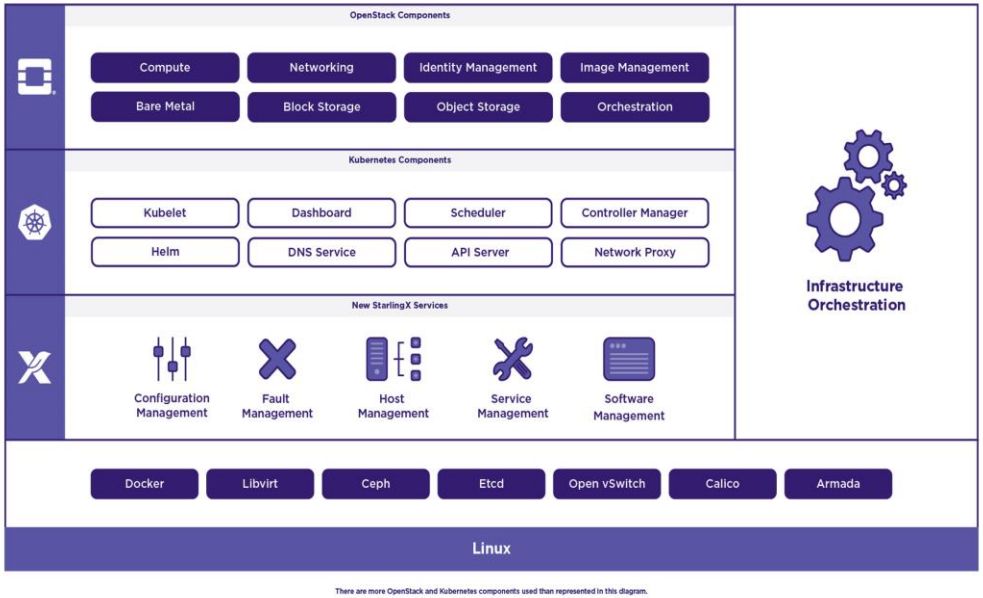
- Leverages the benefits of Cloud Native
- Incorporates the best VM technology
- With a focus on Operations and Day 2 management at the Edge

Plus much, much more…..

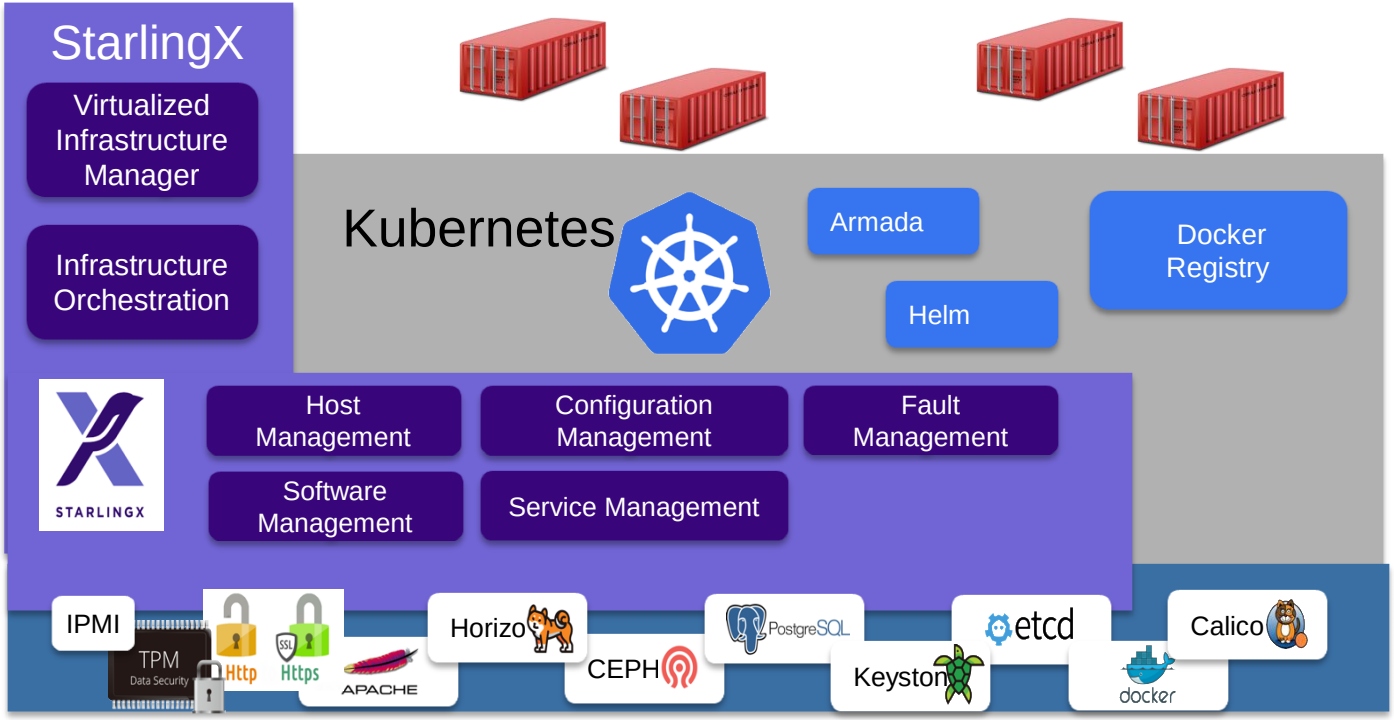


What is StarlingX

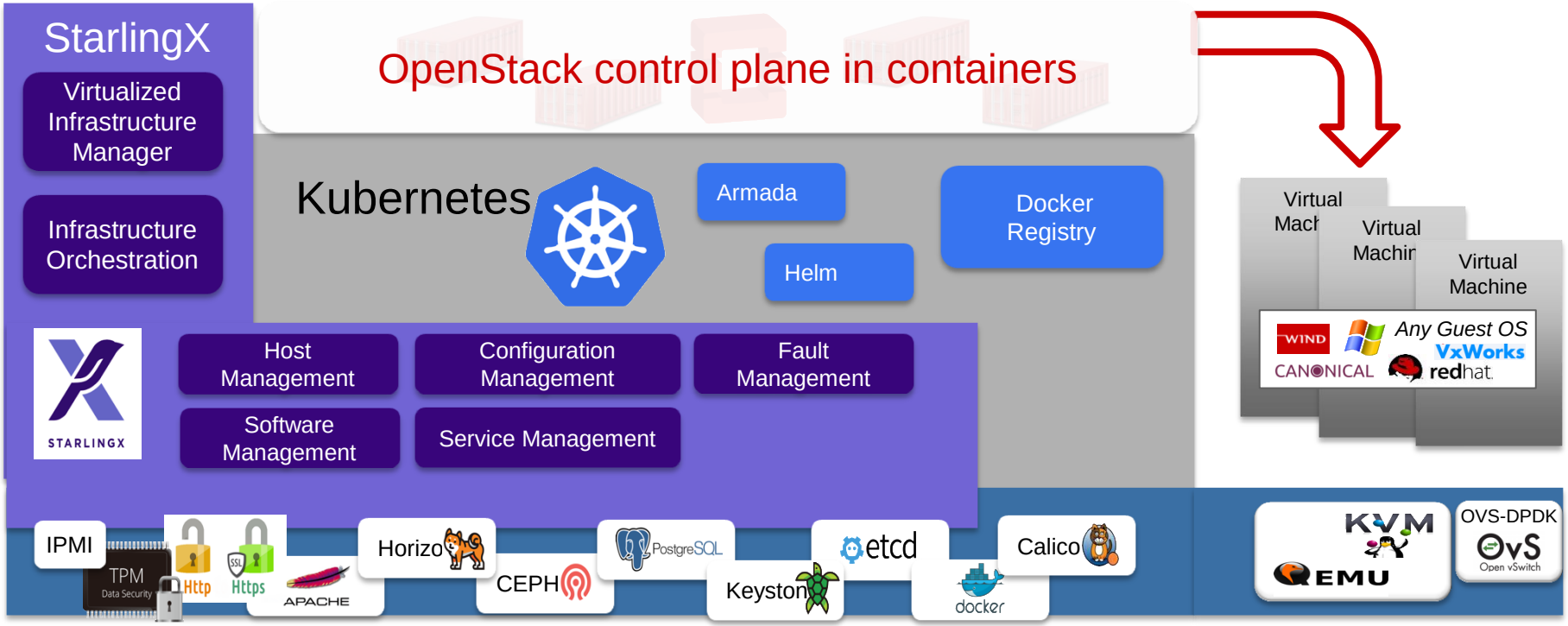
- Upstream project launched under the OpenStack Foundation in May 2018
- Focus on the Edge use cases
- 2nd release Aug/2019 - Achieved
- Community metrics last 90 days:
  - Contributors from more than 10 organizations
  - 1000 emails on Mailing List
  - 584 commits merged
  - 130 people have submittd changes



Use StarlingX to Deploy Containers



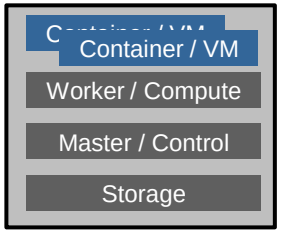
Use StarlingX to Deploy OpenStack and VMs



No Matter what Topology – have your cake and eat it too

Minimum-Footprint Edge Solution

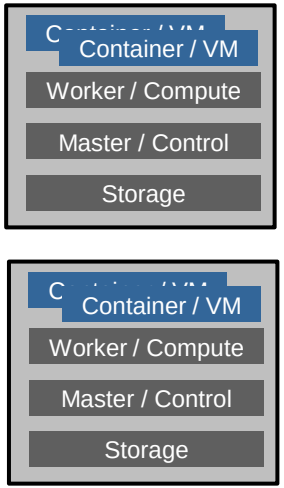
Single server



Low Footprint

Highly-Available Edge Solution

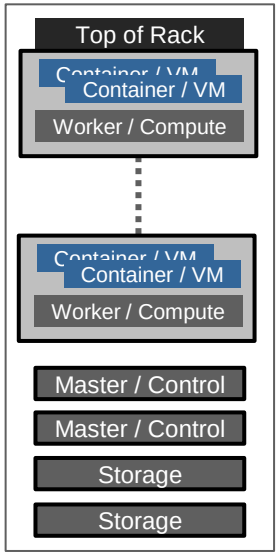
Two servers



1:1 protected pair of servers

Frame-Level Solution

4 –100 servers



Rack/Mini-DataCenter

Summary

- VM’s are very relevant and needed in Telco
- Containers and Kubernetes enable new use cases, highly dynamic environments at the edge
- There are many options to run VMs and Containers
- StarlingX is a project that enables both of the above in an **easy to consume** manner