

오픈스택기반 NFV 관리 및 HA (high Availability) 기술

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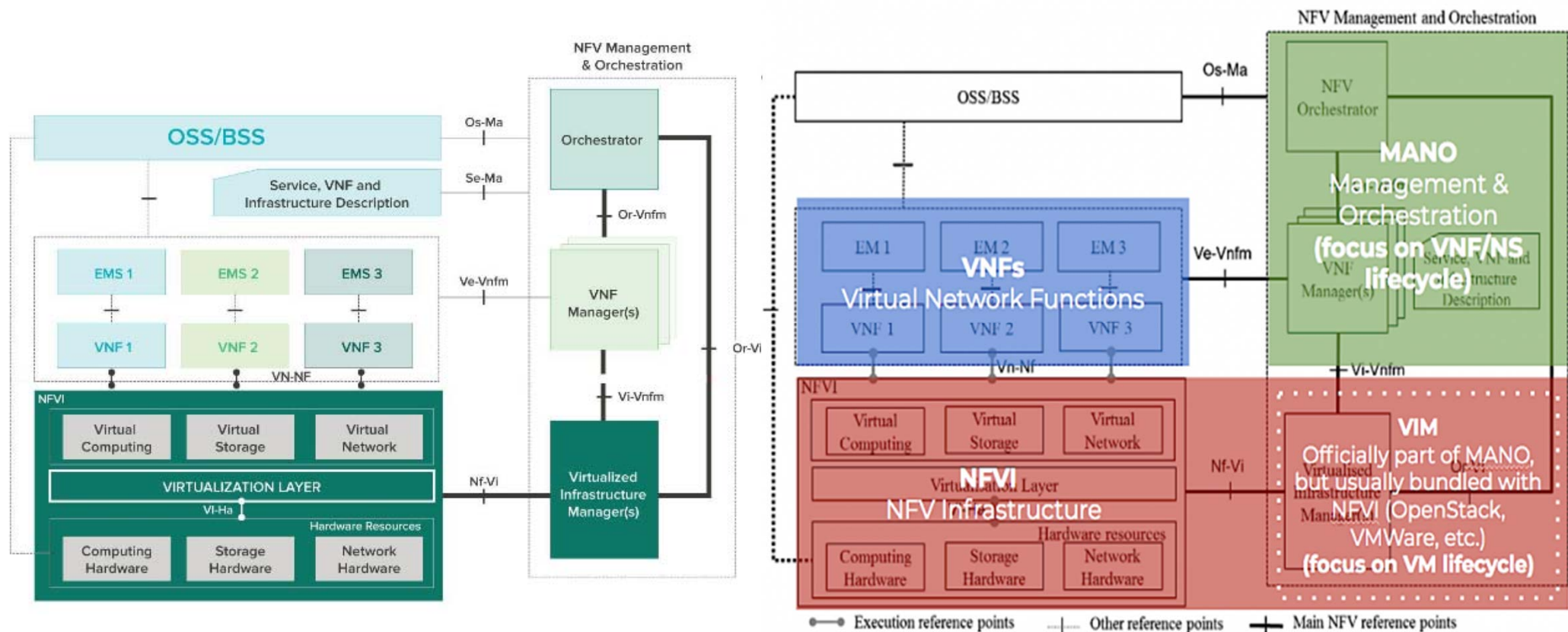
✦ Vitrage project Contribution

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✦ Future Plan

ETSI 표준 NFV Architecture

ETSI NFV Architecture



ETSI 표준 NFV Architecture

✦ Role of the NFVO

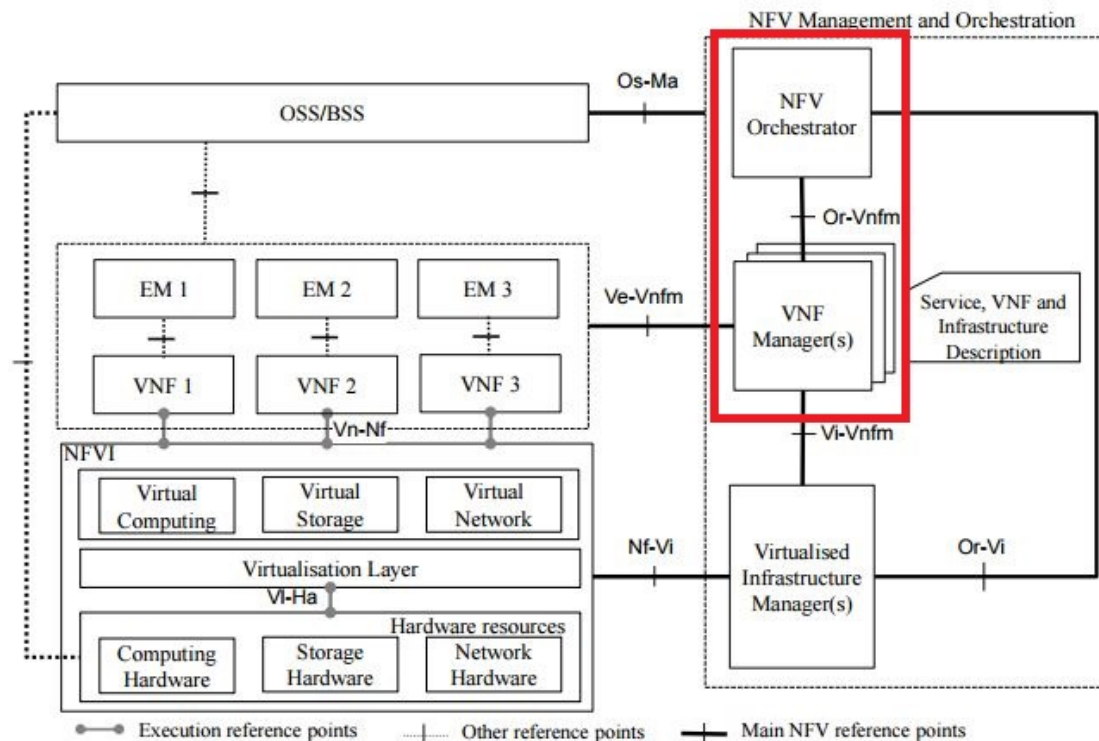
- ✦ on-boarding of new **Network Service (NS), VNF-FG and VNF Packages**
- ✦ **NS lifecycle management** (including instantiation, scale-out/in, performance measurements, event correlation, termination)
- ✦ **Global resource management**, validation and authorization of NFVI resource requests
- ✦ **policy management** for NS instances

✦ Role of the VNFM

- ✦ **lifecycle management of VNF instances**
- ✦ **overall coordination and adaptation role for configuration** and event reporting between NFVI and the E/NMS

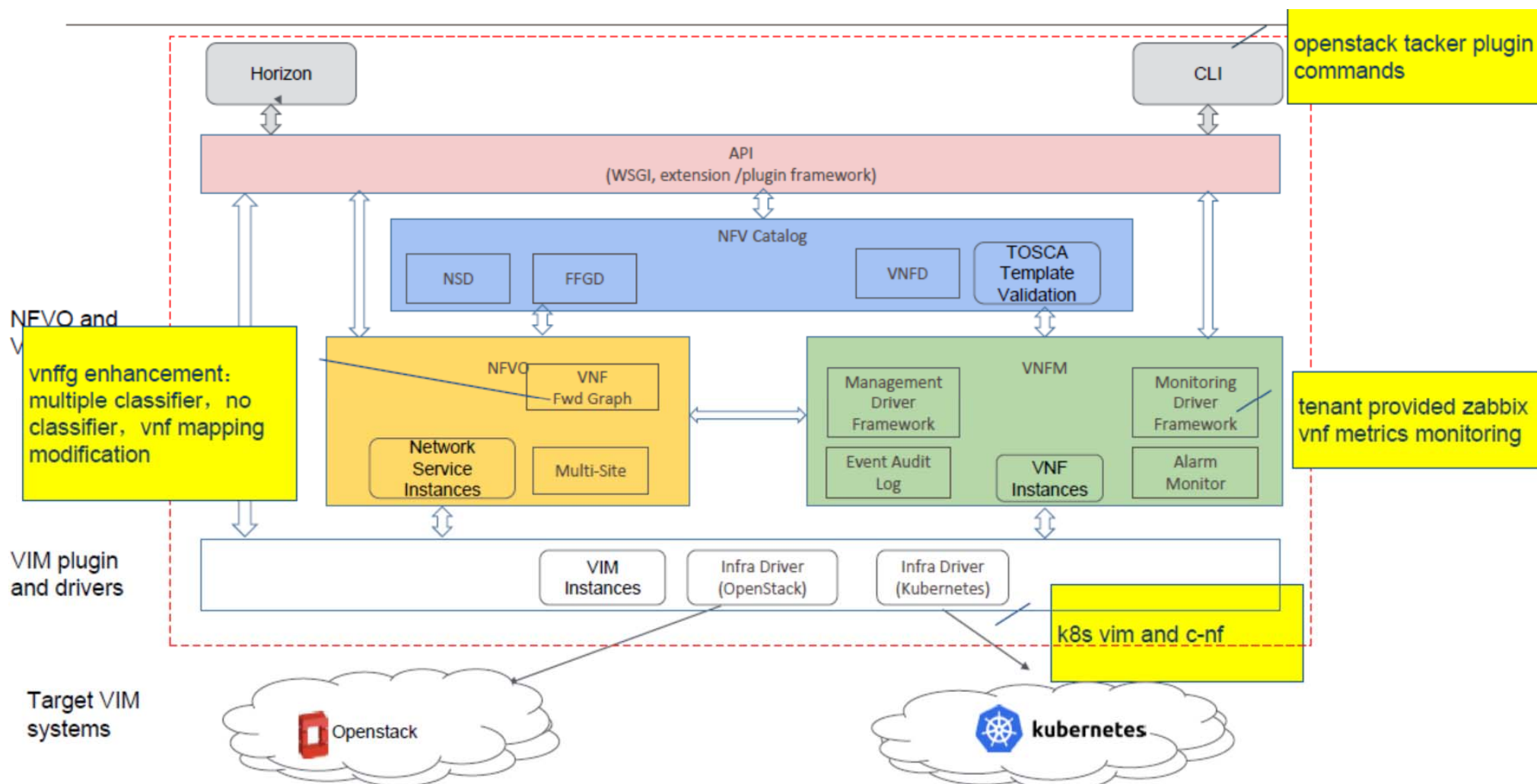
OpenStack Tacker(VNFM)

- ✦ Tacker is an OpenStack based **NFV Orchestration framework** used to deploy and operate Virtual Network Functions (VNFs).
- ✦ Tacker is compatible with **ETSI NFV Architectural Framework** and provides full functional stack to manage VNFs and orchestrate end-to-end Network Services on various VIMs.



OpenStack Tacker(VNFM)

✦ Updates on Tacker Architecture



OpenStack Tacker(VNFM)

OpenStack Queens Features

+ New features

- + Multiple flow classifiers per VNF forwarding graph (VNFFG).
- + Symmetric VNFFG.
- + VNFFG updating.
- + VNFFG without flow classifiers.
- + Reusing VNFs in VNFFG.
- + **Zabbix plugin for monitoring VNF's application.**
- + **Kubernetes VIM.**
- + **Container based VNFs.**

OpenStack Tacker(VNFM)

OpenStack Rocky Features

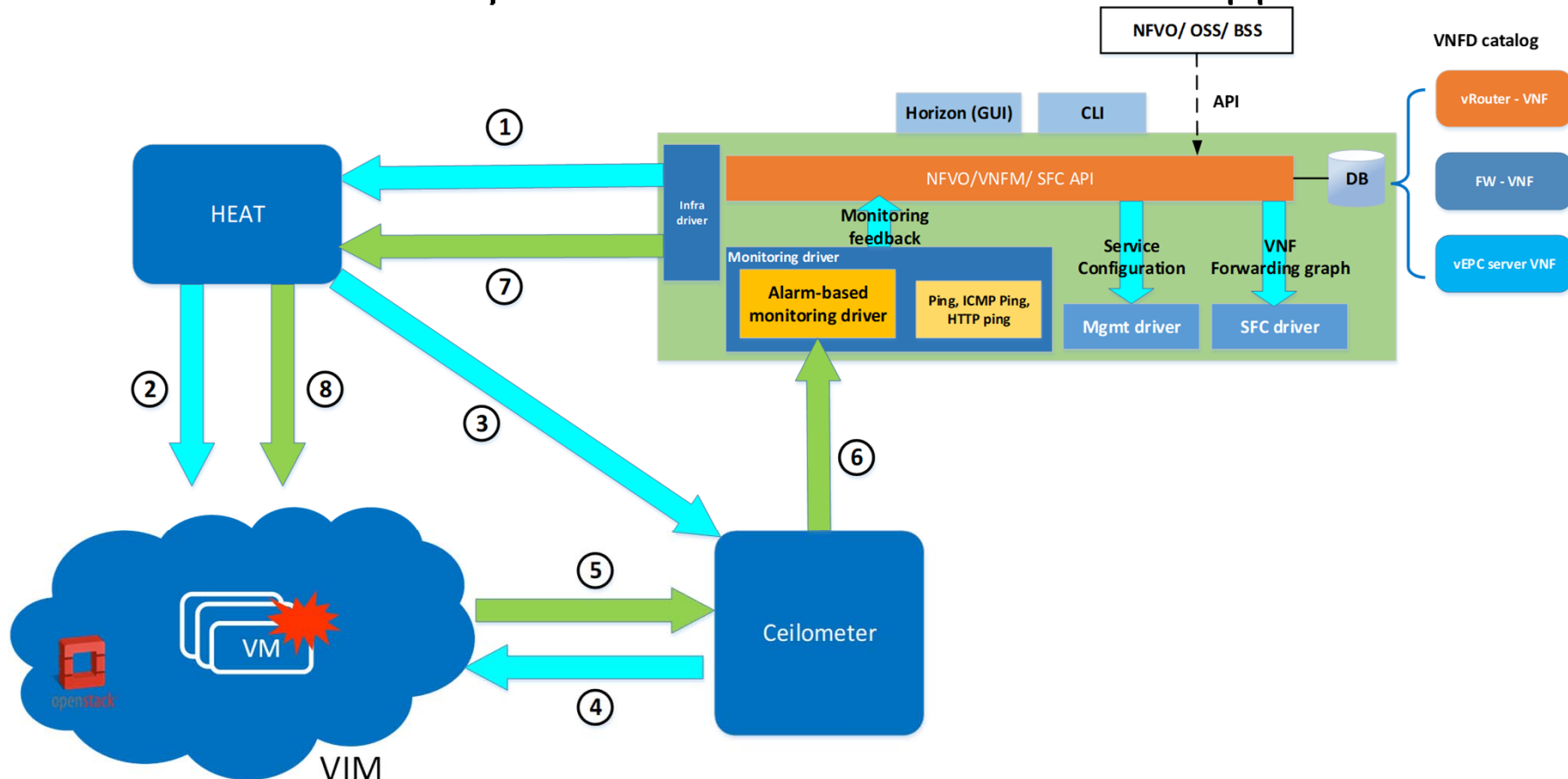
+ New features

- + **SFC feature for hybrid container and VM based VNFs**
(with Kuryr-kubernetes and networking-sfc)
- + Mistral workflow for VNF monitoring
- + Resource reservation for VNFs (with Blazar)
- + **Clustering feature**
- + Multiple forwarding path in VNFFG
- + VNFFG support in network service
- + Doc cleanup & bug fix

Tacker Contribution Result(1)

Alarm based Monitoring framework (Ocata)

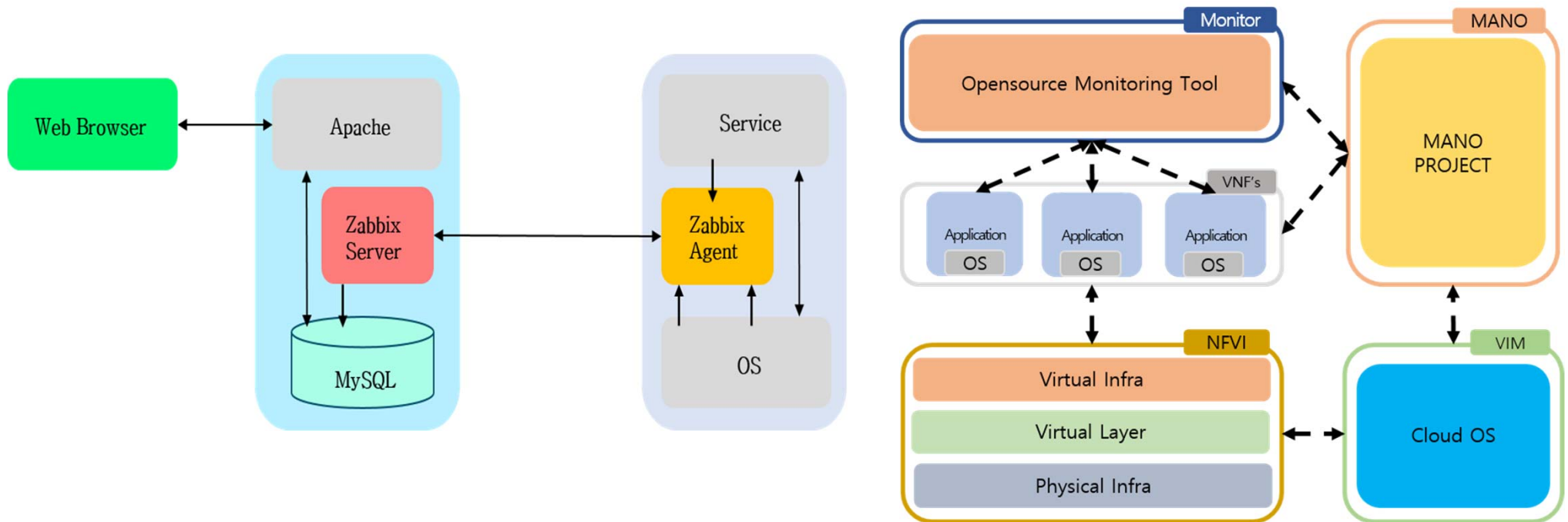
- alarm-based monitoring driver can completely **monitor any resources** in OpenStack that Ceilometer can support.



Tacker Contribution Result (2)

✦ Zabbix Plugin for Application Monitoring (Pike)

- ✦ Develop a Zabbix plugin in Tacker VNF manager to **monitor application level parameters**



Tacker Contribution Result (2)

✦ Zabbix Plugin for Application Monitoring (Pike)

✦ Proposed in September 2017, the **final merge** in January 2018

✦ **Announced** at the Open Stack **Vancouver** Summit in May 2018

The collage consists of four images. The top-left image shows a speaker on stage at the OpenStack Summit Vancouver 2018. The top-right image is a presentation slide with the OpenStack logo and the text 'OPENSTACK SUMMIT VANCOUVER 2018 OPEN INFRASTRUCTURE' and 'CI/CD | CONTAINERS | EDGE | HPC | NFV | PUBLIC & PRIVATE CLOUD'. The bottom-left image is a presentation slide titled 'New zabbix vnf monitoring' showing a diagram of the monitoring architecture. The bottom-right image is a presentation slide showing a TOSCA Template for the zabbix vnf monitoring.

Diagram: New zabbix vnf monitoring

```
graph TD
    ZabbixServer[Zabbix Server] -- configure --> ZabbixPlugin[Zabbix Plugin]
    ZabbixServer -- "monitor and trigger actions" --> ZabbixAgent[Zabbix agent]
    ToscaTemplate[Tosca Zabbix Template] --> TackerVNFM[Tacker VNFM]
    TackerVNFM --> ZabbixPlugin
    TackerVNFM --> NFVI[NFVI]
    NFVI --> VDU[VDU]
    VDU --> ZabbixAgent
```

TOSCA Template

```
app_monitoring_policy:
  name: zabbix
  zabbix_username: Admin
  zabbix_password: zabbix
  zabbix_server_ip: 192.168.11.53
  zabbix_server_port: 80
  parameters:
    application:
      app_name: apache2
      app_port: 80
      ssh_username: ubuntu
      ssh_password: ubuntu
      app_status:
        condition: [down]
        actionname: cmd
        cmd-action: sudo service apache2 restart
      app_memory:
        condition: [greater,22]
        actionname: cmd
        cmd-action: sudo service apache2 stop
```

```
OS:
  os_agent_info:
    condition: [down]
    actionname: cmd
    cmd-action: sudo service zabbix-agent restart
  os_proc_value:
    condition: [and less,22]
    actionname: cmd
    cmd-action: sudo reboot
  os_cpu_load:
    condition: [and greater,30]
    actionname: cmd
    cmd-action: sudo reboot
  os_cpu_usage:
    condition: [less,30]
    actionname: cmd
    cmd-action: sudo reboot
```

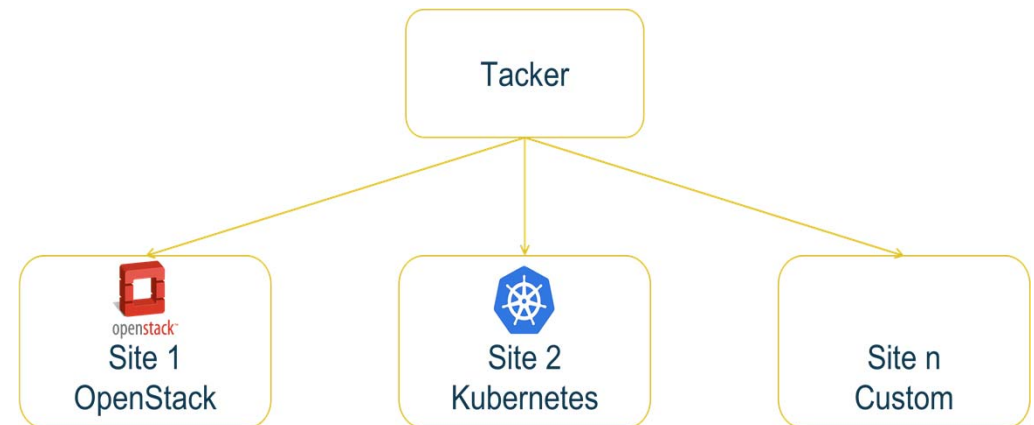
Vancouver Summit Announcement

Tacker Contribution Result(3)

✦ Kubernetes as VIM in Tacker (Pike)

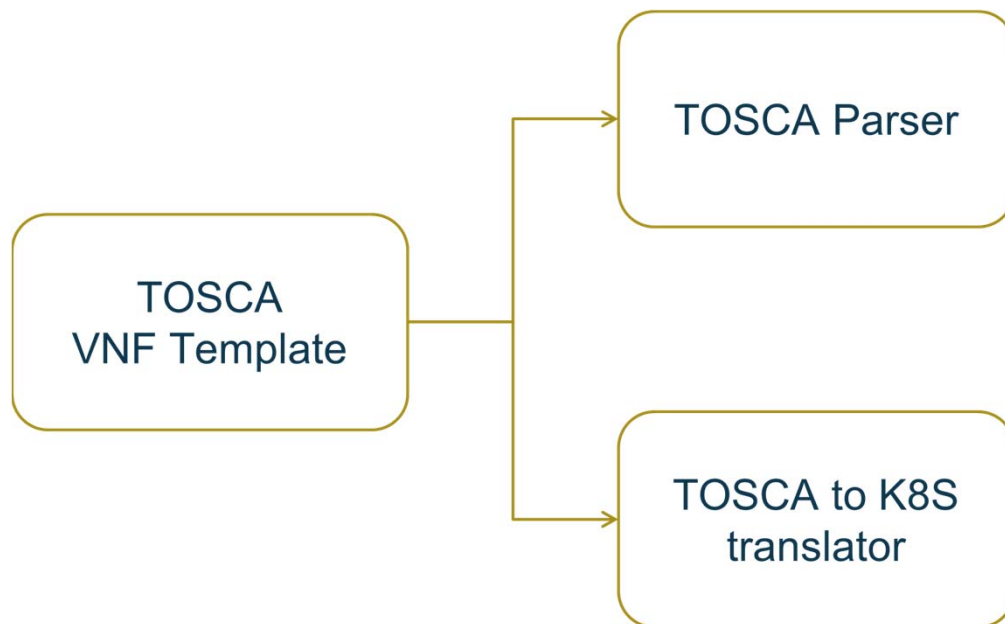
- ✦ Create Kubernetes type of containerized VNF(c-VNF)
- ✦ Hybrid cloud deployments of VM and Container based VNF, NS.

- auth_url: https://192.168.11.110:6443
- username: "admin"
- password: "admin"
- ssl_ca_cert: None
- type: "kubernetes"



Tacker Contribution Result (4)

- ✦ Add Kubernetes type of containerized VNF to Tacker (Pike)
 - ✦ Support network functions as containers using Kubernetes type, that will be deployed on Kubernetes VIM.



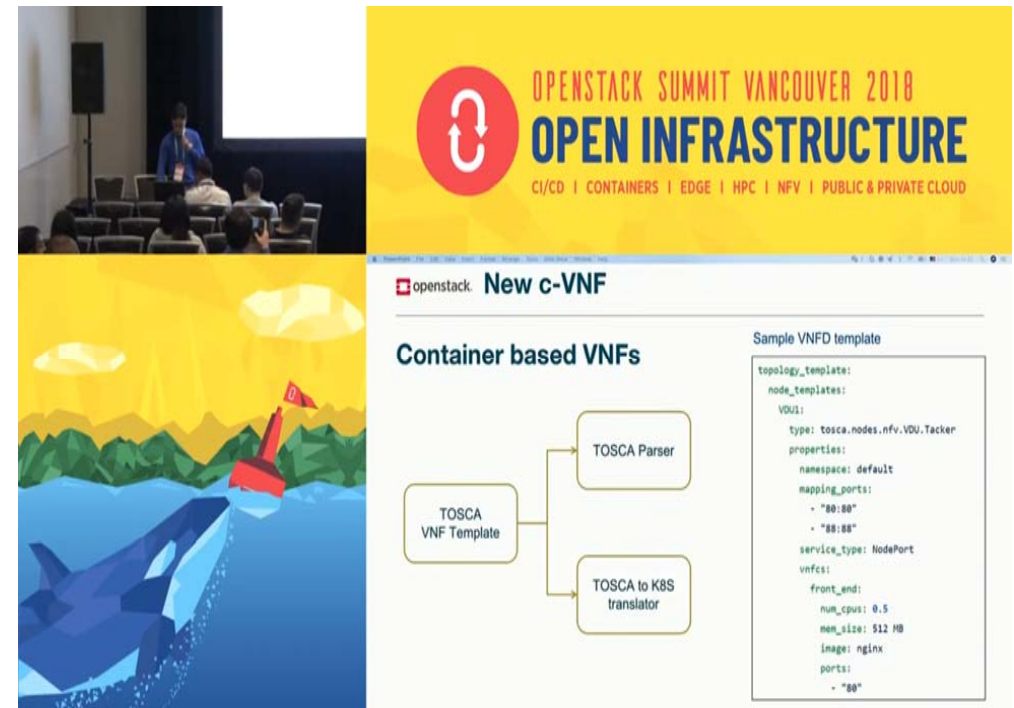
Sample VNFD template

```
topology_template:
  node_templates:
    VDU1:
      type: tosca.nodes.nfv.VDU.Tacker
      properties:
        namespace: default
        mapping_ports:
          - "80:80"
          - "88:88"
        service_type: NodePort
      vnfc:
        front_end:
          num_cpus: 0.5
          mem_size: 512 MB
          image: nginx
          ports:
            - "80"
```

Tacker Contribution Result (4)

✦ Kubernetes VIM & Containerized VNF

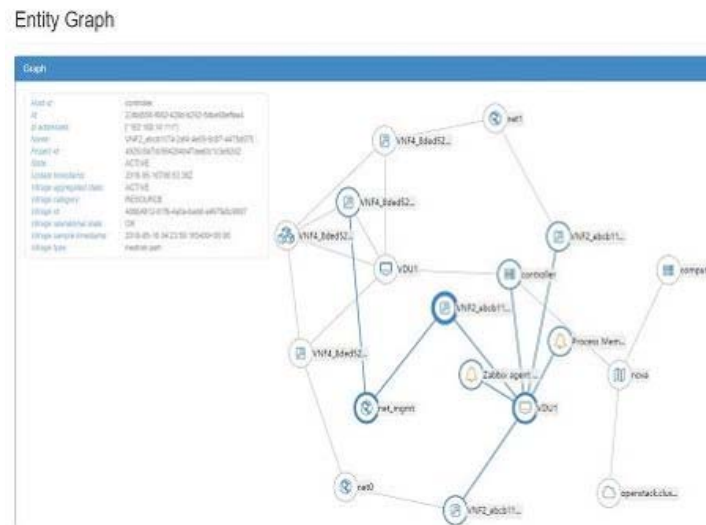
- ✦ Proposed in September 2017, the **final merge** in January 2018
- ✦ **Announced** at the Open Stack **Vancouver** Summit in May 2018



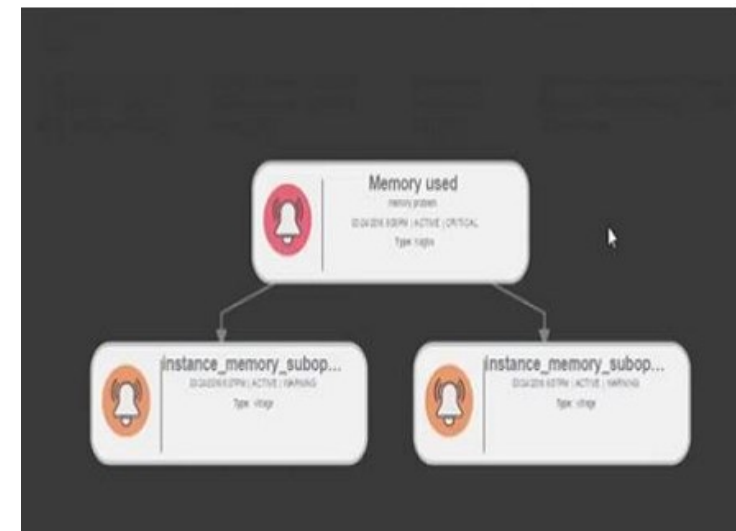
OpenStack Vitrage Project

✦ Vitrage(RCA)

- ✦ Collecting **Fault Alarms** from the Monitoring Server
- ✦ Infrastructure configuration and representation of each VNF **as an entity**, showing **relationship** between them
- ✦ Provides a **tree structure** for the **root cause** of failure through relationship analysis



Vitrage Entity Graph

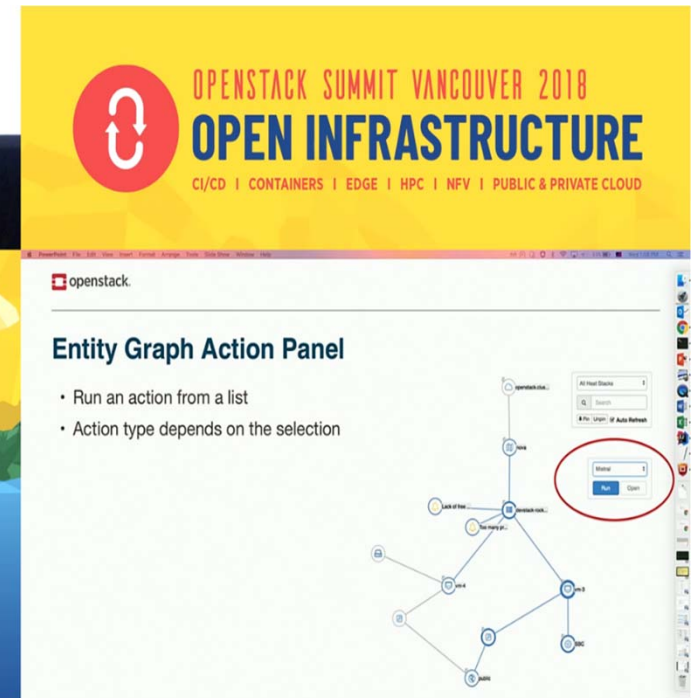
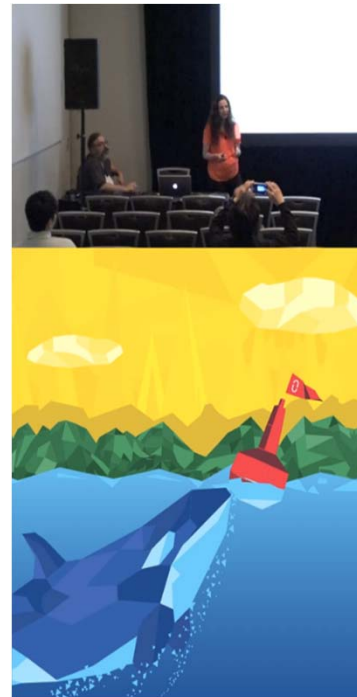
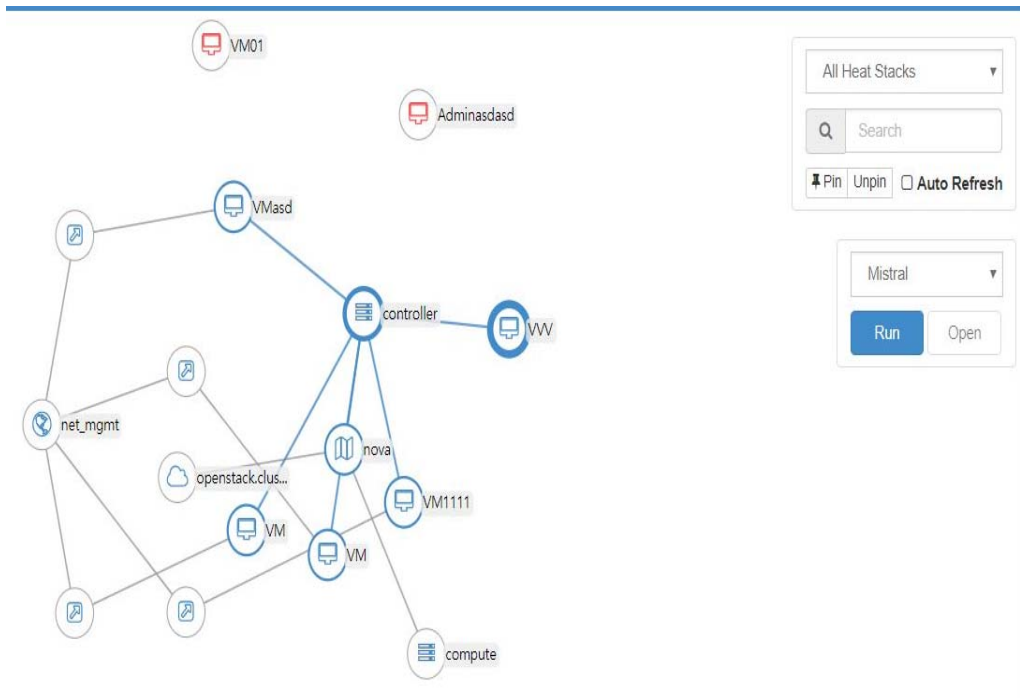


Vitrage RCA Graph

Vitrage Contribution Result

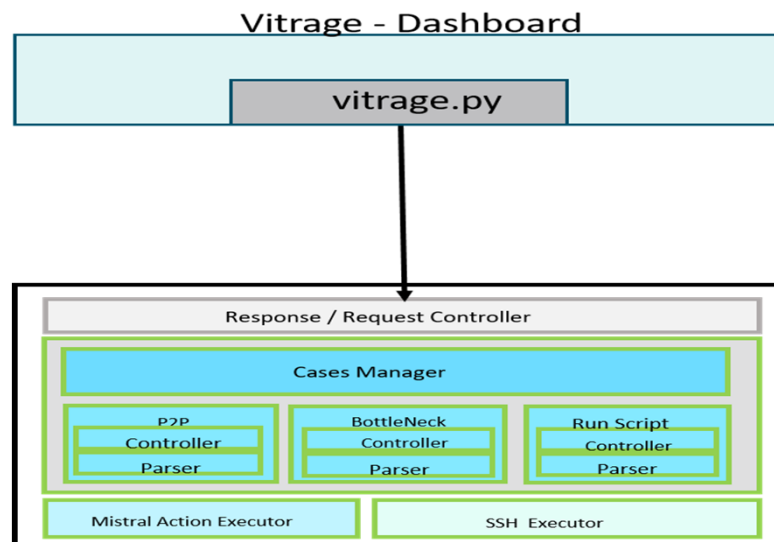
Vitrage Project(RCA)

- ✦ Composite panel components for failure analysis (in progress)
 - ✦ Proposal of a **plug-in panel component** to provide **testing** and **recovery** of problems in case of failure analysis
 - ✦ Vitrage Rocky version featured at Vancouver Summit

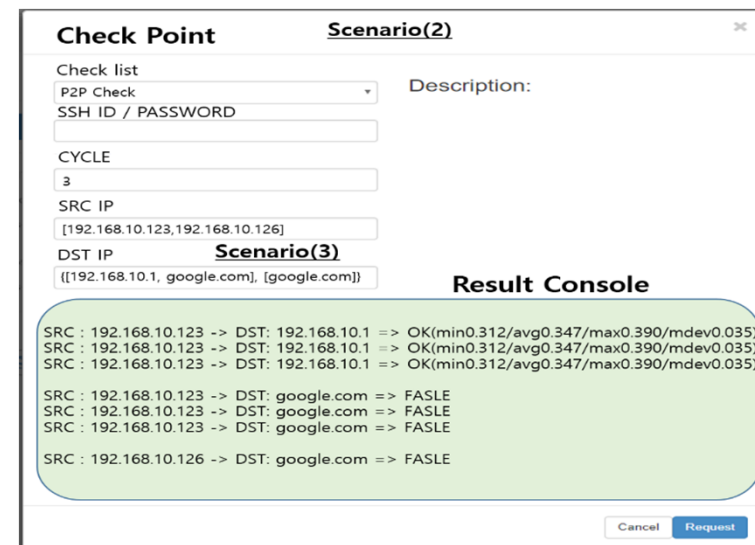


Future Plan for HA

- ✦ Real-time inspection component at VNF system level
 - ✦ A **real-time inspection** component for analyzing the cause of failure at **the system level of VNF** (2018.4)
 - ✦ Real-time check on **multiple VNFs** in **private cloud** provides accurate fault analysis
 - ✦ At the Open Stack Vancouver Summit Meeting, the proposal was **discussed**



Component Architecture

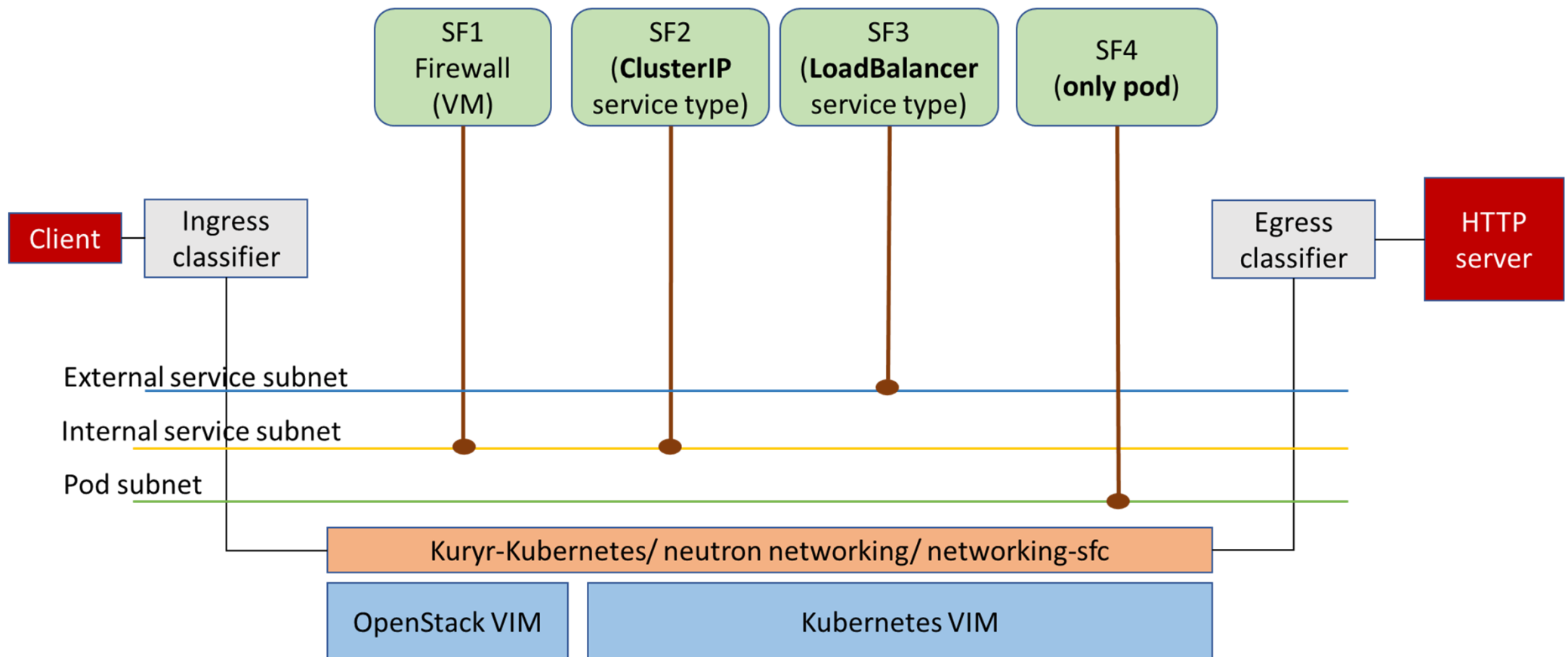


Function use-case

Future Plan for HA

✦ SFC for hybrid VNFs in Tacker

- ✦ Support running VM and container based VNFs on the same neutron subnet (because networking-sfc does not support across subnets).



Thank You