

CHINA
OpenStack Days

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IT大咖说
知识分享平台

基于**Tacker+Networking-SFC** 的服务链编排方案实践

任亮
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1

NFV架构介绍

2

OPNFV的实践

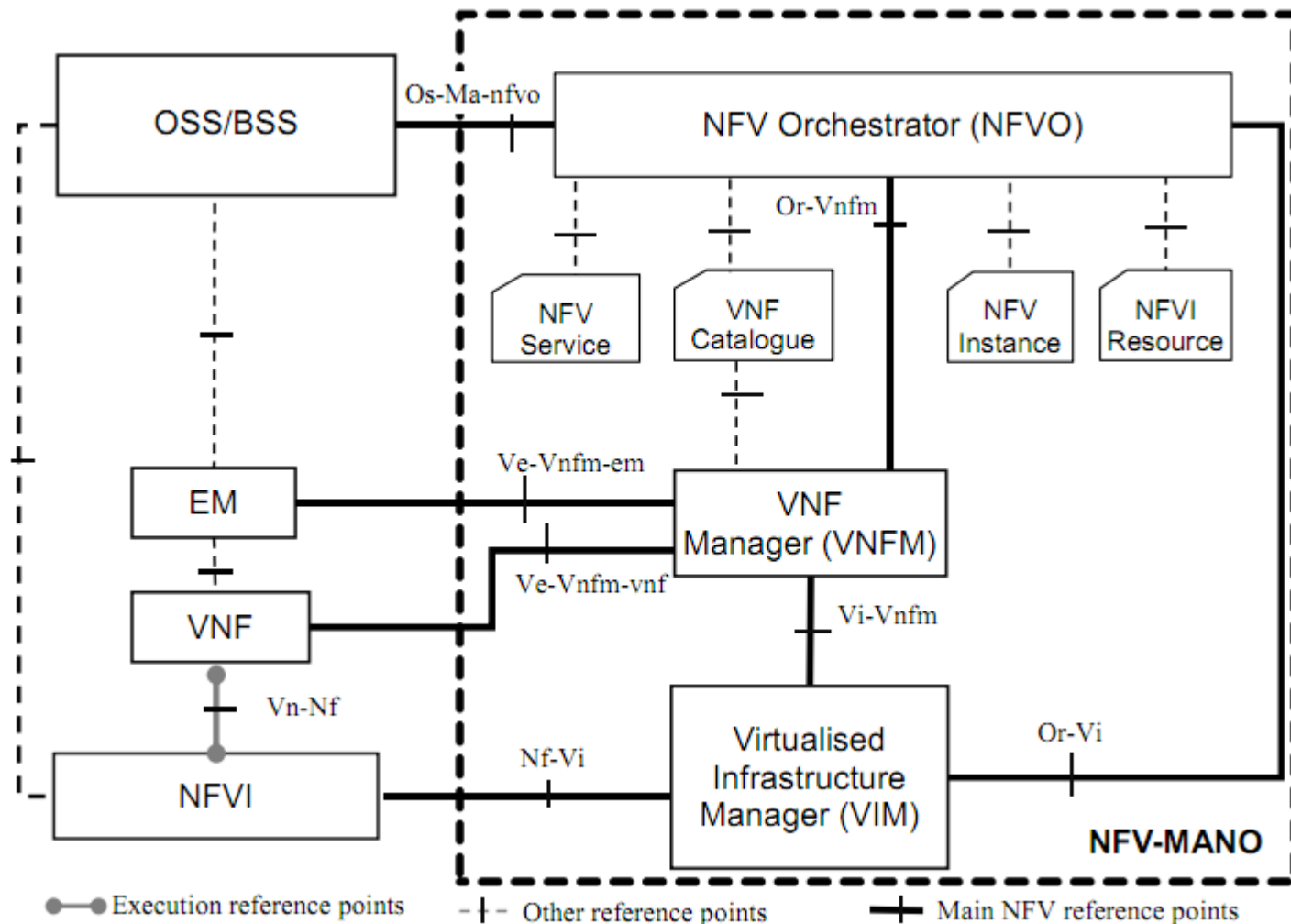
3

Tacker+Networking-SFC的实践

4

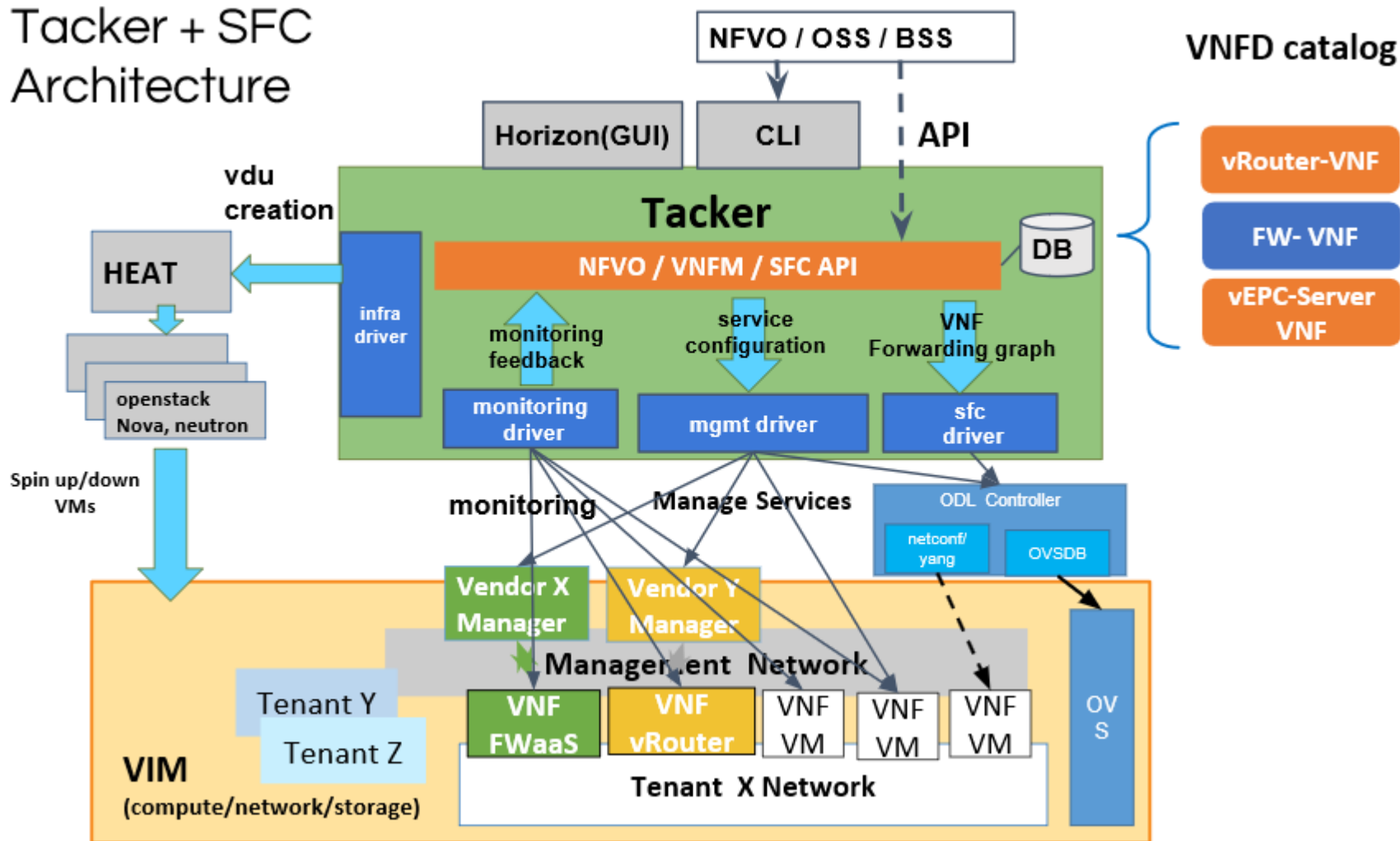
遗留问题

ETSI定义的NFV框架

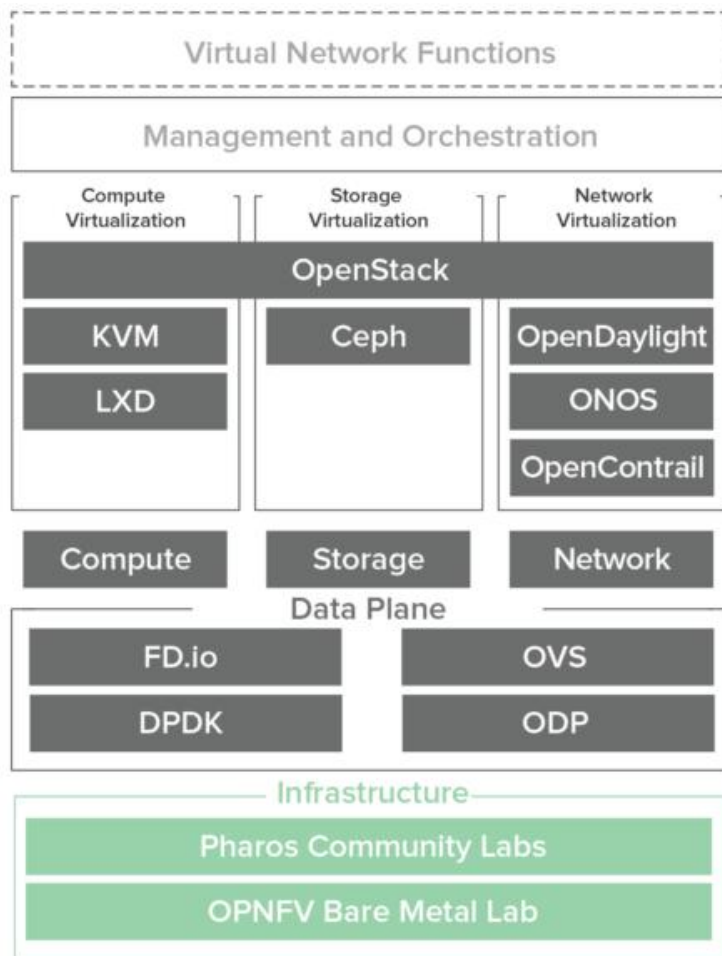


OpenStack的MANO组件—Tacker

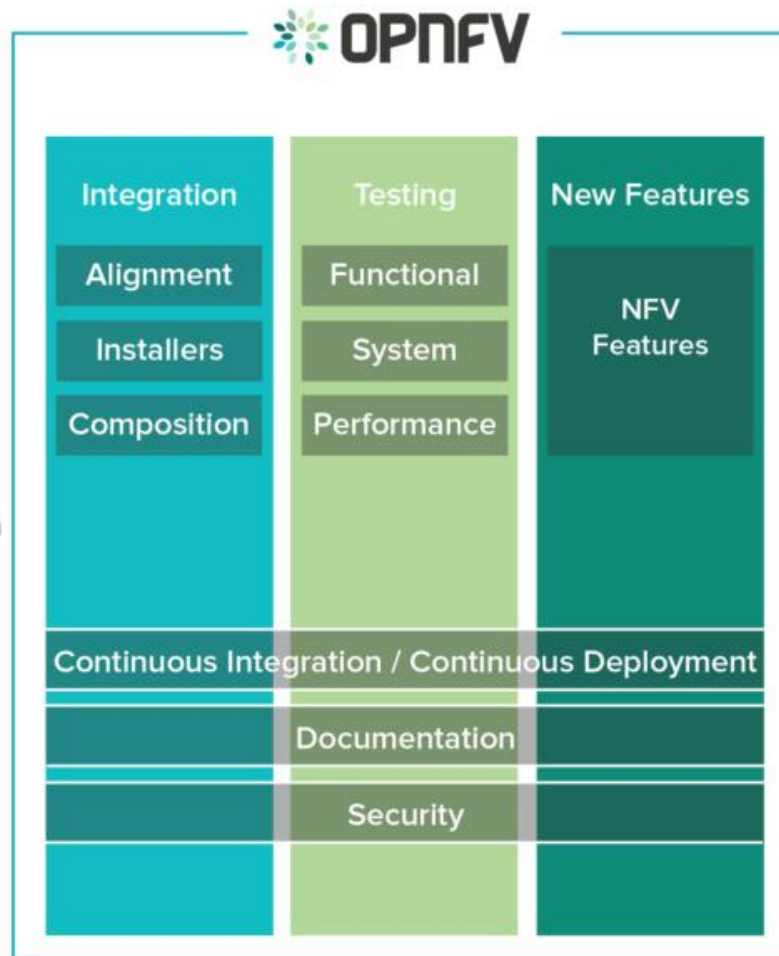
Tacker + SFC Architecture



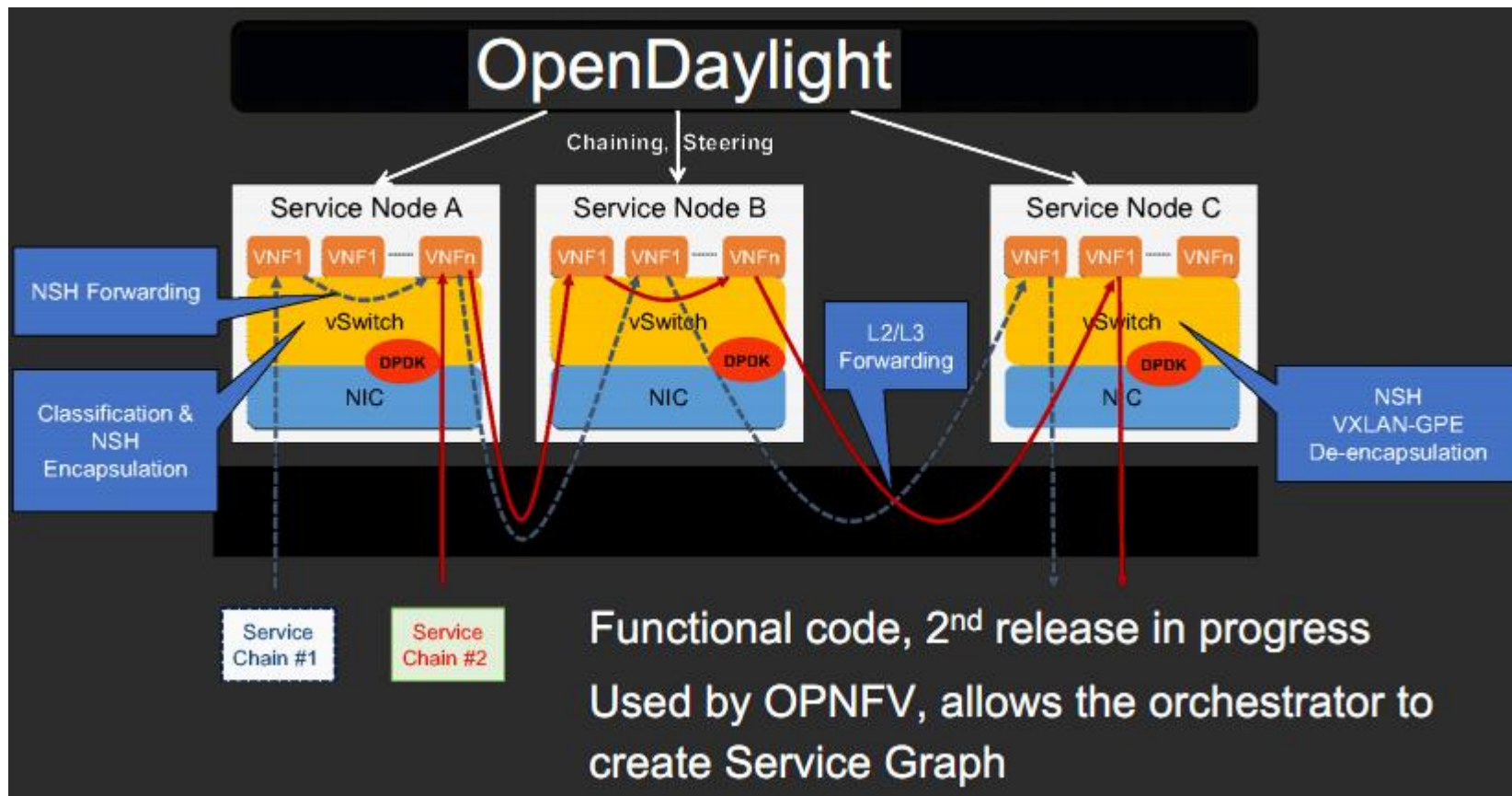
OPNFV的框架



←
Upstream
Project
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→



OPNFV的SFC方案



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遗留问题

OPNFV的NFV实践—Danube 2.0

Controller, Cinder, Tacker VNF manager, OpenDaylight controller (1)

Select All



Untitled (54:e2)

CONTROLLER · CINDER · TACKER · OPENDAYLIGHT



READY

CPU: 2 (4) RAM: 9.0 GB HDD: 400.0 GB



Compute (1)

Select All



Untitled (af:db)

COMPUTE



READY

CPU: 2 (16) RAM: 16.0 GB HDD: 300.0 GB



<http://artifacts.opnfv.org/fuel/danube/opnfv-danube.2.0.iso>

Install Open vSwitch with NSH

Plugin version: 1.0.0
Description: This plugin provides to deploy Open vSwitch with NSH
Authors: ruijing.guo@intel.com
Licenses: Apache License Version 2.0
Releases: Ubuntu: newton-10.0

OpenDaylight plugin

Plugin version: 1.0.0
Description: This plugin provides OpenDaylight as a backend for neutron.
Authors: Michal Skalski, Nikolas Hermanns
Licenses: Apache License Version 2.0
Releases: Ubuntu: newton-10.0

Tacker VNF manager

Plugin version: 1.0.0
Description: Tacker VNF manager
Authors: Michal Skalski, Mirantis/Priya, Cavium
Licenses: Apache License Version 2.0
Releases: Ubuntu: newton-10.0

OPNFV的实践—Plugin

Tacker VNF manager ⚠

This plugin is now enabled. However, this plugin does not have "hot pluggable" compatibility. Your environment may stop functioning properly if this plugin is applied after initial deployment. Please consult with the plugin developer if you experience issues.

Versions 1.0.0

Install Open vSwitch with NSH ⚠

This plugin is now enabled. However, this plugin does not have "hot pluggable" compatibility. Your environment may stop functioning properly if this plugin is applied after initial deployment. Please consult with the plugin developer if you experience issues.

Versions 1.0.0

Install NSH

Install same OVS version on the Controller

OPNFV的实践—Plugin

OpenDaylight plugin ⚠

This plugin is now enabled. However, this plugin does not have "hot pluggable" compatibility. Your environment may stop functioning properly if this plugin is applied after initial deployment. Please consult with the plugin developer if you experience issues.

Versions 1.0.0

Use ODL to manage L3 traffic ⚠

SFC features ⚠

Classifier used by SFC

NetVirt ▼

Classifier determines what traffic needs to be chained based on policy based on yang model. The OpenDaylight actually supports the OVSDB NetVirt and the GBP classifier in case of SFC.

OPNFV的实践—ODL/SFC

OPEN DAYLIGHT SFC

Topology SFC Nodes Yang UI Yang Visualizer

Service Nodes **Service Function Forwarders** Service Functions Service Function Chains Service Function Paths Access Lists/Classifiers NSH Metadata

IPFIX APPID System info Config

Add Service Function Forwarder Create new Open vSwitch bridge Clear sorting

SFF Inventory

Service Function Forwarder name	IP management address	REST URI	Service Node	Data plane locator	Service Function dictionary	Actions
<input type="text" value="Search by name"/>	<input type="text" value="Search by ip-mgmt-ad"/>	<input type="text" value="Search by rest-uri"/>	<input type="text" value="Search by service-nod"/>	<input type="text" value="Search by sff-data-plz"/>	<input type="text" value="Search by service-functic"/>	

OPEN DAYLIGHT Nodes

Topology SFC **Nodes** Yang UI Yang Visualizer

Search Nodes

Node Id	Node Name	Node Connectors	Statistics
No data found			

```
root@node-2:~# ovs-vsctl list Open_vSwitch
_uuid          : 71312e3c-b7a9-4398-90ae-3c8768b57b03
bridges        : [79c1d4a0-0157-40f4-9064-b69b78d199a7]
cur_cfg        : 2
datapath_types : [netdev, system]
db_version     : "7.14.0"
external_ids   : {hostname="node-2.domain.tld", system-id="c5772249-ecbc-4f8e-8705-0841ac71bd50"}
iface_types    : [geneve, gre, internal, ipsec_gre, lisp, patch, stt, system, tap, vxlan]
manager_options : [805a0f7a-2ce1-42b1-b20e-cc34180874e1]
next_cfg       : 2
other_config   : {local_ip="192.168.4.1"}
ovs_version    : "2.6.1"
ssl            : []
statistics     : {}
system_type    : ubuntu
system_version : "16.04"
root@node-2:~#
```

```
Commands for API v1.0:
bash-completion      Prints all of the commands and options for bash-completion.
device-create        create a Device.
device-delete        Delete a given Device.
device-list          List device that belong to a given tenant.
device-show          show information of a given Device.
device-template-create create a DeviceTemplate.
device-template-delete Delete a given DeviceTemplate.
device-template-list List device template that belong to a given tenant.
device-template-show show information of a given DeviceTemplate.
device-template-update Update a given DeviceTemplate.
device-update        Update a given Device.
ext-list             List all extensions.
ext-show             Show information of a given resource.
help                 print detailed help for another command
interface-attach     Attach a network interface to a server.
interface-detach     Detach a network interface from a server.
sfc-classifier-create Create a Service Function Chain Classifier
sfc-classifier-delete Delete a Service Function Chain
sfc-classifier-list  List all Service Function Chain Classifiers
sfc-classifier-show  Show a Service Function Chain
sfc-classifier-update Update a Service Function Chain
sfc-create           Create a Service Function Chain
sfc-delete           Delete a Service Function Chain
sfc-list             List all Service Function Chains
sfc-show             Show a Service Function Chain
sfc-update           Update a Service Function Chain
vnf-create           create a VNF.
vnf-delete           Delete a given VNF.
vnf-list            List device that belong to a given tenant.
vnf-show            show information of a given VNF.
vnf-update           Update a given VNF.
vnfd-create          create a VNFD.
vnfd-delete          Delete a given VNFD.
vnfd-list           List VNFD that belong to a given tenant.
vnfd-show           show information of a given VNFD.
root@node-1:~# █
```

OPNFV的实践—Tacker

```
root@node-1:~# tacker vnf-list
+-----+-----+-----+-----+-----+
| id | name | description | infra_driver | mgmt_driver |
+-----+-----+-----+-----+-----+
| 90a79f81-76ae-40be-9803-ace87c20a91d | | Demo example | heat | noop |
+-----+-----+-----+-----+-----+
root@node-1:~# tacker vnf-list
+-----+-----+-----+-----+-----+
| id | name | description | mgmt_url | status |
+-----+-----+-----+-----+-----+
| 29a2089f-279f-439b-9709-0cb7bd63e357 | | Demo example | | ACTIVE |
+-----+-----+-----+-----+-----+
root@node-1:~# heat stack-list
WARNING (shell) "heat stack-list" is deprecated, please use "openstack stack list" instead
+-----+-----+-----+-----+-----+
| id | stack_name | stack_status | creation_time | updated_
time |
+-----+-----+-----+-----+-----+
| 7801bc36-6418-4cf6-91e7-4017ab1d2436 | tacker.vm.drivers.heat.heat_DeviceHeat-29a2089f-279f-439b-9709-0cb7bd63e357 | CREATE_COMPLETE | 2017-05-21T07:37:09Z | None
|
+-----+-----+-----+-----+-----+
root@node-1:~# nova list
+-----+-----+-----+-----+-----+
| ID | Name | Status | Task State | Power State | Networks |
+-----+-----+-----+-----+-----+
root@node-1:~#
```


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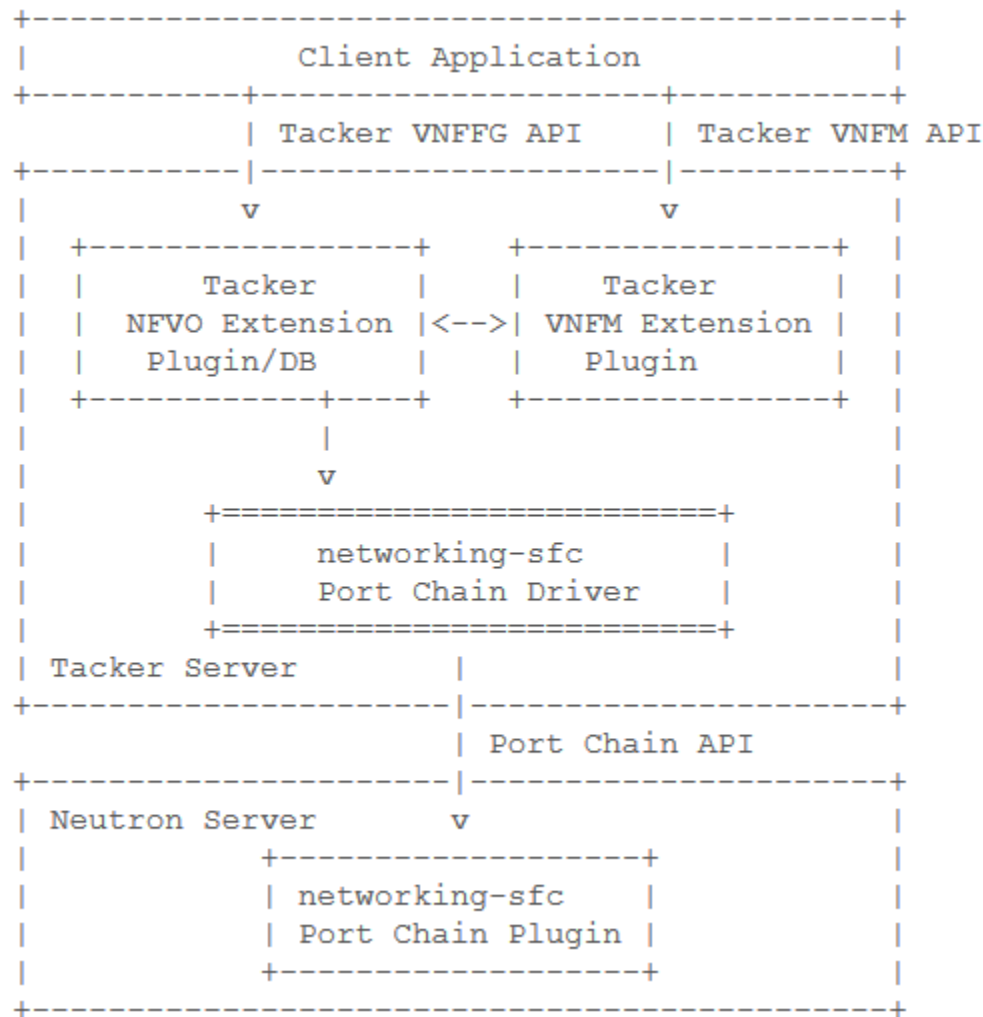
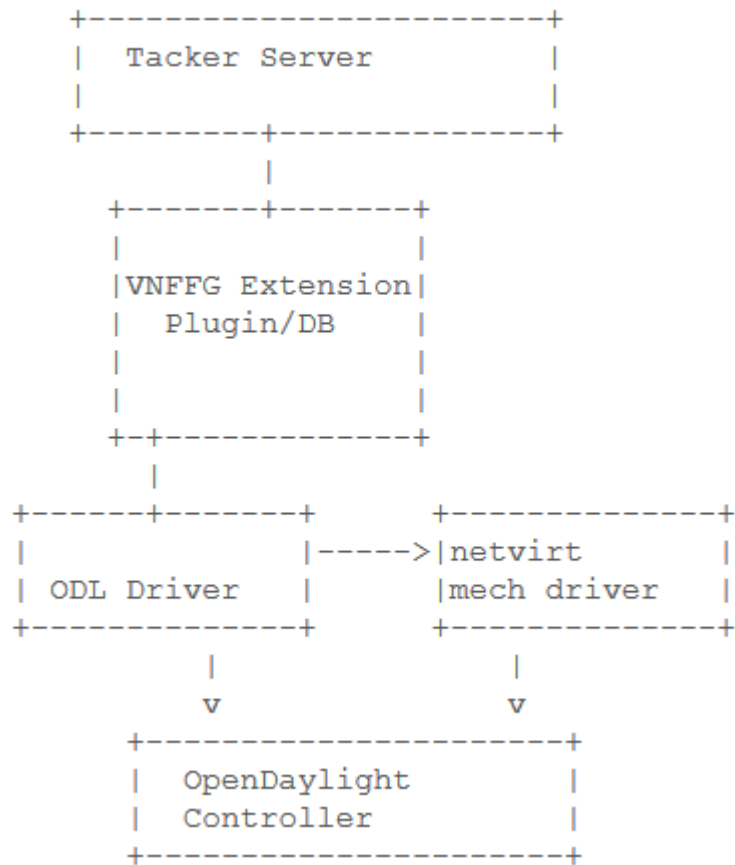
Tacker+Networking-SFC的实践

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遗留问题

Tacker对Networking-SFC的驱动

Tacker SFC Overview:



<https://specs.openstack.org/openstack/tacker-specs/index.html>

```
root@controller:/home/ubuntu# tacker vim-list
```

id	tenant_id	name	type	description	auth_url	placement_attr	auth_cred	status
0f6e6fc7-7684-41dc-a5a6-aff7792905d9	a08b4c2905894b7891d071306f858f08	VIM	openstack		http://10.90.3.55:35357/v3	{'regions': [u'RegionOne']}	{'username': u'tacker', 'password': u'***', 'project_name': u'service', 'user_domain_name': u'default', 'auth_url': u'http://10.90.3.55:35357/v3', 'project_id': None, 'project_domain_name': u'default'}	REACHABLE

```
root@controller:/home/ubuntu# tacker vnfd-list
```

id	name	description	infra_driver	mgmt_driver
1c19adae-cd98-4265-9b56-ce7db6588b1f	vfw-uplink	vfw-uplink example	heat	noop
711c5d5e-27e3-4f8d-b8fb-9543f43b52cb	url-filter	url-filter example	heat	noop
72e4b1ec-ccce4-44fd-8e0b-6acb3b57cce8	vfw-downlink	vfw-downlink example	heat	noop
f77f545b-cb0a-4069-b294-3bdb0baf684b	waf	waf example	heat	noop

```
root@controller:/home/ubuntu# tacker vnf-list
```

id	name	description	mgmt_url	status	vim_id	placement_attr	error_reason
3a2aeb22-2117-46c3-8a42-6509f22fcea4	vfw-uplink	vfw-uplink example	{"VDU1": "10.90.3.91"}	ACTIVE	0f6e6fc7-7684-41dc-a5a6-aff7792905d9	{'vim_name': u'VIM'}	
553e7856-58fe-4377-927d-c73d4608b70c	url-filter	url-filter example	{"VDU2": "172.16.11.4"}	ACTIVE	0f6e6fc7-7684-41dc-a5a6-aff7792905d9	{'vim_name': u'VIM'}	
560e0ed4-8b66-45bc-a838-f4900f67265b	waf	waf example	{"VDU1": "172.16.12.13"}	ACTIVE	0f6e6fc7-7684-41dc-a5a6-aff7792905d9	{'vim_name': u'VIM'}	
da7fcd76-06fc-43cd-8268-f8a478a987c2	vfw-downlink	vfw-downlink example	{"VDU1": "192.168.0.1"}	ACTIVE	0f6e6fc7-7684-41dc-a5a6-aff7792905d9	{'vim_name': u'VIM'}	

https://docs.openstack.org/tacker/latest/install/manual_installation.html

Networking-SFC的安装

```
root@controller:/home/ubuntu# neutron flow-classifier-list
+-----+-----+-----+
| id | name | summary |
+-----+-----+-----+
| 2c7bf2cc-b63a-4a3c-ac7f-e4d5b6e00b26 | | protocol: TCP, |
| | | source[port]: any[any:any], |
| | | destination[port]: 0.0.0.0/0[80:80], |
| | | neutron_source_port: 20a1e096-8e08-4ddd-ac13-3e44e3d4deae, |
| | | neutron_destination_port: None, |
| | | l7_parameters: {} |
| bb39beb5-4f26-4ccc-a71d-2b7fed6d1d9b | | protocol: TCP, |
| | | source[port]: any[any:any], |
| | | destination[port]: 192.168.0.250/32[8080:8080], |
| | | neutron_source_port: 97815697-f23e-4261-abc9-ff06a402e187, |
| | | neutron_destination_port: None, |
| | | l7_parameters: {} |
+-----+-----+-----+
root@controller:/home/ubuntu# neutron port-pair-list
+-----+-----+-----+-----+
| id | name | ingress | egress |
+-----+-----+-----+-----+
| 4153229a-4691-49e3-a550-4679e992eb9f | waf-connection-points | 1573f9c6-8a7e-47c2-9239-c40909c4715c | 1573f9c6-8a7e-47c2-9239-c40909c4715c |
| 87dfb56c-3bc5-404b-b781-fe5151a534a1 | url-filter-connection-points | 8d8c0e72-0fd5-4c00-8ce2-97e3ee3fc1ee | 8d8c0e72-0fd5-4c00-8ce2-97e3ee3fc1ee |
+-----+-----+-----+-----+
root@controller:/home/ubuntu# neutron port-pair-group-list
+-----+-----+-----+
| id | name | port_pairs |
+-----+-----+-----+
| cea00bc6-6be9-4e18-b0b7-532552a9459c | waf-port-pair-group | [u'4153229a-4691-49e3-a550-4679e992eb9f'] |
| ede6757c-61c5-47a9-8d6a-f8e411ca8d0f | url-filter-port-pair-group | [u'87dfb56c-3bc5-404b-b781-fe5151a534a1'] |
+-----+-----+-----+
root@controller:/home/ubuntu# neutron port-chain-list
+-----+-----+-----+-----+
| id | name | port_pair_groups | flow_classifiers |
+-----+-----+-----+-----+
| 66a7ea9a-fc84-4423-bcee-e55adfdac157 | sfc-downlink-port-chain | [u'cea00bc6-6be9-4e18-b0b7-532552a9459c'] | [u'bb39beb5-4f26-4ccc-a71d-2b7fed6d1d9b'] |
| ffe59229-e18b-47f8-a286-1ee99490a927 | sfc-uplink-port-chain | [u'ede6757c-61c5-47a9-8d6a-f8e411ca8d0f'] | [u'2c7bf2cc-b63a-4a3c-ac7f-e4d5b6e00b26'] |
+-----+-----+-----+-----+
```

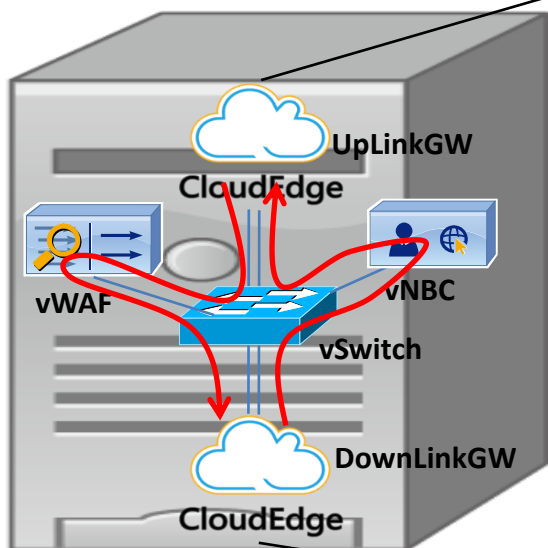
<https://docs.openstack.org/networking-sfc/latest/installation.html>

Networking-SFC的流表

```
root@controller:/home/ubuntu# tacker vnffgd-list
+-----+-----+-----+
| id                | name          | description |
+-----+-----+-----+
| 9c99475a-5d4c-42ca-b706-d83e426bffe  
| f6d844c4-0429-48c1-b3d9-1f1e879ea283 | sfc-downlink |
+-----+-----+-----+
root@controller:/home/ubuntu# tacker vnffgd-list
+-----+-----+-----+-----+-----+
| id                | name          | description | status | vnffgd_id |
+-----+-----+-----+-----+-----+
| 6ab2c261-fa91-4712-9f6c-8f4d25bc8c20 | sfc-downlink |              | ACTIVE | f6d844c4-0429-48c1-b3d9-1f1e879ea283 |
| 7430142c-f0dd-4714-91fe-bb5001689fca | sfc-uplink   |              | ACTIVE | 9c99475a-5d4c-42ca-b706-d83e426bffe  
+-----+-----+-----+-----+-----+
root@controller:/home/ubuntu# ovs-ofctl dump-flows br-int | grep group
 cookie=0xbbdb70444a02889f, duration=1774.995s, table=0, n_packets=0, n_bytes=0, idle_age=1774, priority=30,tcp,in_port=13,nw_dst=192.168.0.250,tp_dst=8080 actions=group:1
 cookie=0xbbdb70444a02889f, duration=1756.347s, table=0, n_packets=0, n_bytes=0, idle_age=1756, priority=30,tcp,in_port=18,tp_dst=80 actions=group:2
root@controller:/home/ubuntu# ovs-ofctl dump-groups br-int -O OpenFlow13
OFPST_GROUP_DESC reply (OF1.3) (xid=0x2):
  group_id=1,type=select,bucket=actions=set_field:fa:16:3e:3c:15:a2->eth_dst,resubmit(,5)
  group_id=2,type=select,bucket=actions=set_field:fa:16:3e:ea:c0:2b->eth_dst,resubmit(,5)
root@controller:/home/ubuntu# █
```

NFV一体机服务链方案PoC

TOSCA (Topology Orchestration Specification for Cloud Applications)



外部网

内部网

```
Topology template:
topology_template:
  description: Sample VNFFG template
node_templates:
  Forwarding_path1:
    type: toska.nodes.nfv.FP.Tacker
    description: creates path (ext->waf->internal)
    properties:
      id: 51
      policy:
        type: ACL
        criteria:
          - network_src_port_id: c299ebbb-1993-4019-b06b-ca024d7e6d0f
          - ip_dst_prefix: 192.168.0.0/24
          - destination_port_range: 80-80
          - ip_proto: 6
      path:
        - forwarder: waf
          capability: CP12
groups:
  VNFFG1:
    type: toska.groups.nfv.VNFFG
    description: ext to internal
    properties:
      vendor: tacker
      version: 1.0
      number_of_endpoints: 5
      dependent_virtual_link: [VL12]
      connection_point: [CP12]
      constituent_vnfs: [waf]
      members: [Forwarding_path1]
```

流量入口

引流规则

服务节点

openstack Default • service tacker

项目 >
管理员 >
身份管理 >
NFV >
VNF MANAGEMENT >
NFV ORCHESTRATION >
VIM Management
VNFFG Catalog
VNFFG Manager

NFV / NFV Orchestration /

VIM Management

筛选 + Register VIM Delete VIMs

<input type="checkbox"/>	名称	描述	VIM Id	Auth URL	Regions	用户	项目	状态
<input type="checkbox"/>	VIM		0f6e6fc7-7684-41dc-a5a6-aff7792905d9	http://10.90.3.55:35357/v3	RegionOne	tacker	service	REACHABLE

Displaying 1 item

NFV业务操作—创建VNF模板

The screenshot shows the OpenStack VNF Catalog interface. The breadcrumb path is "NFV / VNF Management /". The page title is "VNF Catalog". There are two buttons: "+ Onboard VNF" and "Delete VNFs". A search box with the text "筛选" is present. Below is a table with 4 items:

<input type="checkbox"/>	名称	描述	服务	Catalog Id
<input type="checkbox"/>	vfw-uplink	vfw-uplink example		1c19adae-cd98-4265-9b56-ce7db6588b1f
<input type="checkbox"/>	url-filter	url-filter example		711c5d5e-27e3-4f8d-b8fb-9543f43b52cb
<input type="checkbox"/>	vfw-downlink	vfw-downlink example		72e4b1ec-cce4-44fd-8e0b-6acb3b57cce8
<input type="checkbox"/>	waf	waf example		f77f545b-cb0a-4069-b294-3bdb0baf684b

Displaying 4 items

<https://github.com/openstack/tacker/tree/master/samples/tosca-templates/vnfd>

NFV业务操作—创建VNF实例

openstack Default • admin admin

项目 > NNF / VNF Management /

管理员 >

身份管理 >

NFV >

VNF MANAGEMENT >

VNF Catalog

VNF Manager

NFV ORCHESTRATION >

VNF Manager

筛选 + Deploy VNF Terminate VNFs

<input type="checkbox"/>	VNF Name	描述	Deployed Services	VIM	状态	Error Reason
<input type="checkbox"/>	vfw-uplink	vfw-uplink example		VIM	ACTIVE	-
<input type="checkbox"/>	url-filter	url-filter example		VIM	ACTIVE	-
<input type="checkbox"/>	waf	waf example		VIM	ACTIVE	-
<input type="checkbox"/>	vfw-downlink	vfw-downlink example		VIM	ACTIVE	-

Displaying 4 items | Next >

NFV业务操作—创建VNFFG模板

openstack Default • admin admin

NFV / NFV Orchestration /

VNFFG Catalog

筛选 + Onboard VNFFG Delete VNFFGs

<input type="checkbox"/>	名称	描述	Catalog Id
<input type="checkbox"/>	sfc-uplink		9c99475a-5d4c-42ca-b706-d83e426bfea
<input type="checkbox"/>	sfc-downlink		f6d844c4-0429-48c1-b3d9-1f1e879ea283

Displaying 2 items

<https://github.com/openstack/tacker/tree/master/samples/tosca-templates/vnffgd>

NFV业务操作—创建VNFFG实例

openstack Default • admin admin

项目 >
管理员 >
身份管理 >
NFV >
 VNF MANAGEMENT >
 NFV ORCHESTRATION >
 VIM Management
 VNFFG Catalog
 VNFFG Manager

NFV / NFV Orchestration /

VNFFG Manager

筛选 + Deploy VNFFG Terminate VNFFGs

<input type="checkbox"/>	VNFFG Name	描述	Status
<input type="checkbox"/>	sfc-downlink		ACTIVE
<input type="checkbox"/>	sfc-uplink		ACTIVE

Displaying 2 items | Next »

NFV业务操作—查看VNF栈

openstack Default • service tacker

项目 / 云编排 / 栈

栈

筛选 + 创建栈 栈预览 删除堆栈 More Actions

资源类型	栈名	已创建	已更新	状态	Actions
模板版本	tacker.vnm.infra_drivers.openstack.openstack_OpenStack-553e7856-58fe-4377-927d-c73d4608b70c	45 分钟	从不	创建完成	检查栈
	tacker.vnm.infra_drivers.openstack.openstack_OpenStack-560e0ed4-8b66-45bc-a838-f4900f67265b	47 分钟	从不	创建完成	检查栈
	tacker.vnm.infra_drivers.openstack.openstack_OpenStack-da7fd76-06fc-43cd-8268-f8a478a987c2	50 分钟	从不	创建完成	检查栈
	tacker.vnm.infra_drivers.openstack.openstack_OpenStack-3a2aeb22-2117-46c3-8a42-6509f22fcea4	52 分钟	从不	创建完成	检查栈

Displaying 4 items

openstack Default • service tacker

项目 / 计算 / 云主机数量

云主机数量

云主机名字 = 筛选 [创建云主机](#) [删除云主机](#) [More Actions](#)

<input type="checkbox"/>	云主机名称	镜像名称	IP 地址	大小	密钥对	状态	可用域	任务	电源状态	创建后的时间	Actions
<input type="checkbox"/>	ta-7856-58fe-4377-927d-c73d4608b70c-VDU2-ss oxxduns34a	CloudEdge	vfw-inter-con-uplink • 172.16.11.4 vfw-mgt • 10.0.0.14	CloudEdge	-	运行	nova	无	运行中	46 分钟	创建快照
<input type="checkbox"/>	ta-0ed4-8b66-45bc-a838-f4900f67265b-VDU1-p4 w22awqabb7	CloudEdge	vfw-inter-con-downlink • 172.16.12.13 vfw-mgt • 10.0.0.13	CloudEdge	-	运行	nova	无	运行中	47 分钟	创建快照

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NFV架构介绍

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OPNFV的实践

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Tacker+Networking-SFC的实践

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遗留问题

- Tacker的Newton Stable版本有严重bug，界面上创建VNFFG失败，可以用Ocata Stable版本的vnffgmanager进行替换，仍然存在bug，界面上创建VNFFG时提示找不到VNF，但能成功。
- 普通Linux发行版不适合做VNF，不支持单臂路由。
- Ubuntu第二块网卡不抢占默认路由，Centos第二块网卡抢占默认路由。
- Ocata版本的Tacker+Networking-SFC虽然更成熟，但不支持嵌套虚拟化（libvirt从1.3版本升级到2.5版本），给方案验证带来麻烦。

THANK YOU