

Open Source MANO

OSM Hackfest – Session 4.1 Modeling EPA capabilities in VNF

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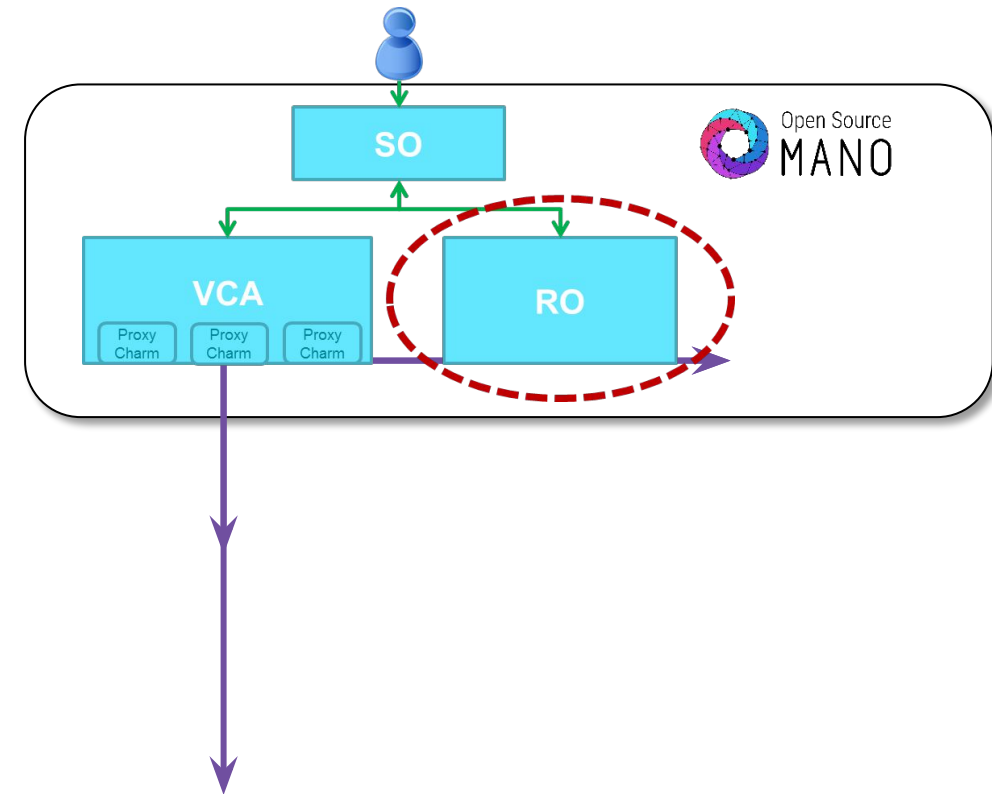
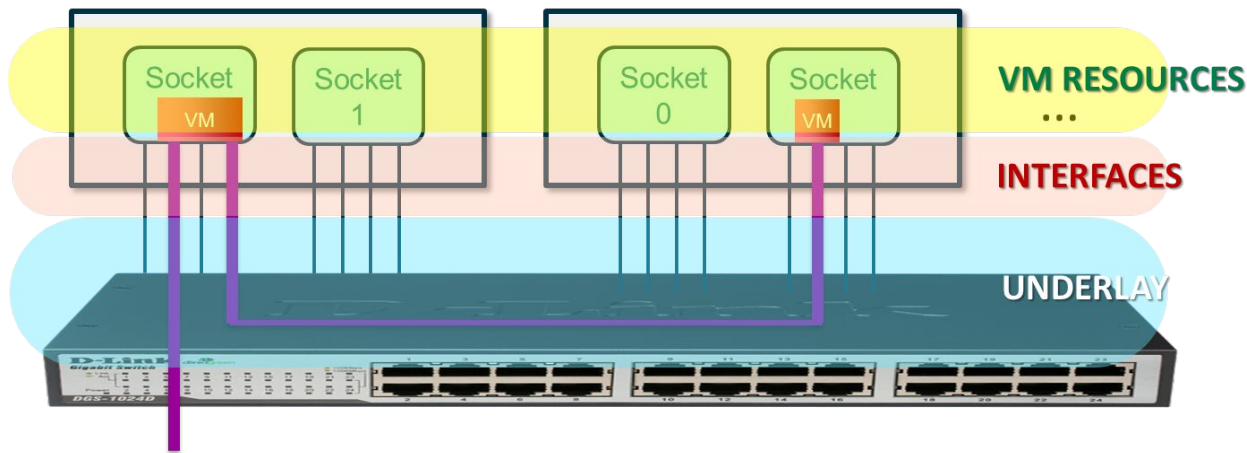


EPA (Enhanced Placement Awareness)

- **EPA features** like use of large hugepages memory, dedicated CPUs, strict NUMA node placement, the use of passthrough and SR-IOV interfaces, **can be used in OSM's VNF descriptors since Rel Zero.**
- If your VIM supports EPA, then you don't need to do anything extra to use it from OSM. VIM connectors in OSM take advantage of EPA capabilities if the VIM supports it. All you need to do is build your descriptors and deploy.
- Openstack configuration for EPA ([reference guide](#))

EPA support combined with SDN Assist enables chaining of high performance VNFs

1. Accurate assignment of resources at VM level
2. Proper assignment of I/O interfaces to the VM
3. **SDN gives the ability to create underlay L2 connections**
 - Interconnecting VMs
 - Attaching external traffic sources



Adding new VIM account: openstack-epa

- VIM:
 - openstack-epa: <vim_ip>
- Test VIM:
 - ping <vim_ip>
 - curl http://<vim_ip>:5000/v2.0

Load Openstack credentials:

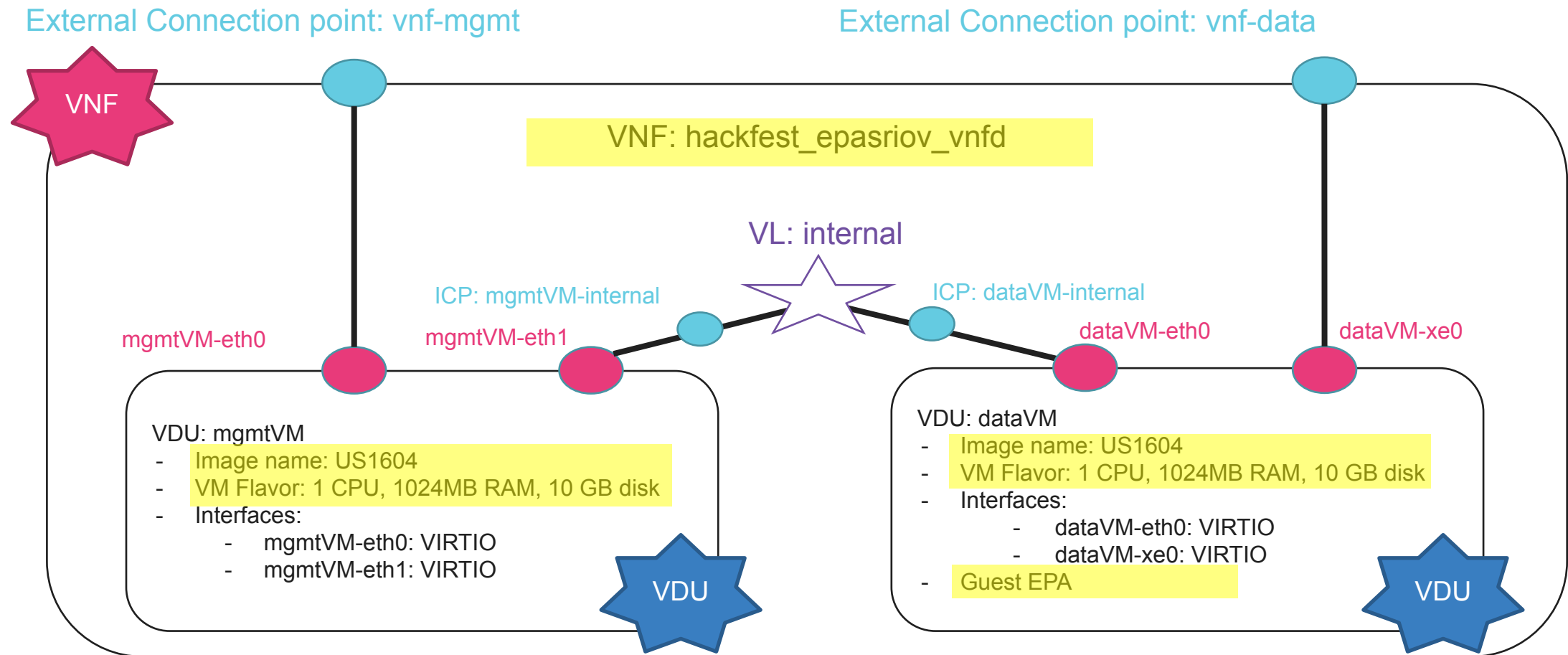
```
export OS_AUTH_URL=http://<vim_ip>:5000/v2.0
export OS_USERNAME=osm
export OS_TENANT_NAME=osm
export OS_PASSWORD=osm
```

- Run some commands:
 - openstack image list
 - openstack network list
 - openstack flavor list
 - openstack server list

Adding new VIM account: openstack-epa

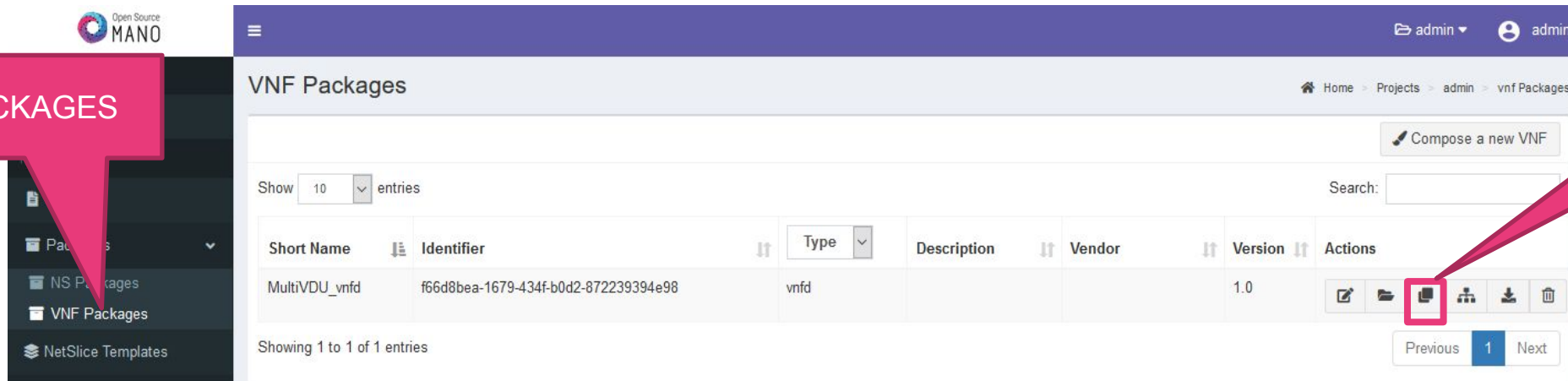
- Add your second VIM 'openstack-epa' with the OSM client:
 - ```
osm vim-create --name openstack-epa --account_type openstack \
 --auth_url http://<vim_ip>:5000/v2.0 \
 --user <username> --password <password> --tenant <tenant> \
 --description "ETSI openstack site 2, with EPA, with tenant <tenant>" \
 --config '{dataplane_physical_net: physnet_sriov, microversion: 2.32}'
```
  - `osm vim-list`
  - `osm vim-show openstack-epa`
- Config options:
  - `dataplane_physical_net`:
    - Used to instantiate VMs with SR-IOV and Passthrough interfaces
    - Value: The physical network label used in Openstack both to identify SRIOV and passthrough interfaces (nova configuration) and also to specify the VLAN ranges used by SR-IOV interfaces (neutron configuration).
  - `microversion`:
    - Used for device role tagging
    - Value: 2.32

# VNF diagram - Changes highlighted in yellow



# User Interface

- Clone hackfest\_multivdu\_vnfd in the user interface



VFN PACKAGES

CLONE THE VNF

Open Source MANO







admin admin

### VNF Packages

Home > Projects > admin > vnf Packages

Compose a new VNF

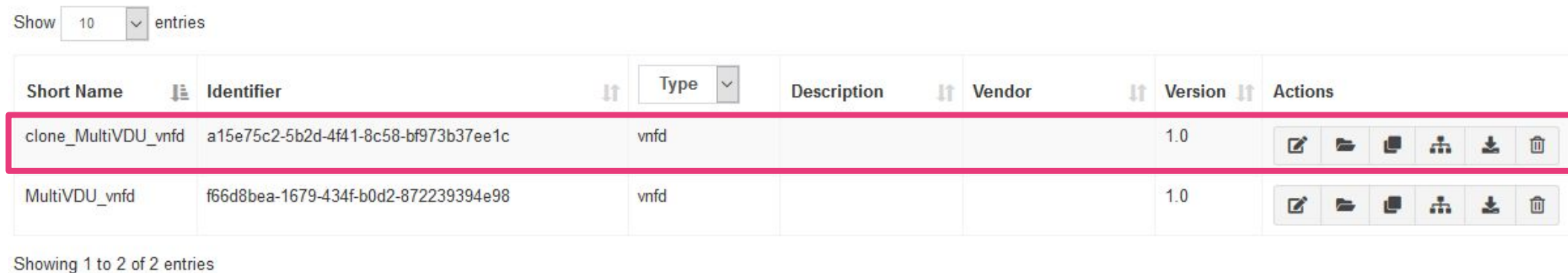
Show 10 entries Search:

| Short Name    | Identifier                           | Type | Description | Vendor | Version | Actions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------|--------------------------------------|------|-------------|--------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MultiVDU_vnfd | f66d8bea-1679-434f-b0d2-872239394e98 | vnfd |             |        | 1.0     |       |













Showing 1 to 1 of 1 entries

Previous 1 Next

- A new hackfest\_multivdu\_vnfd appears:



Show 10 entries

| Short Name          | Identifier                           | Type | Description | Vendor | Version | Actions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|--------------------------------------|------|-------------|--------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| clone_MultiVDU_vnfd | a15e75c2-5b2d-4f41-8c58-bf973b37ee1c | vnfd |             |        | 1.0     |       |
| MultiVDU_vnfd       | f66d8bea-1679-434f-b0d2-872239394e98 | vnfd |             |        | 1.0     |       |

Showing 1 to 2 of 2 entries

# Creating the VNFD

- Edit the new descriptor
- Modify the name and id: hackfest\_epasriov\_vnfd
- Modify VDU dataVM:

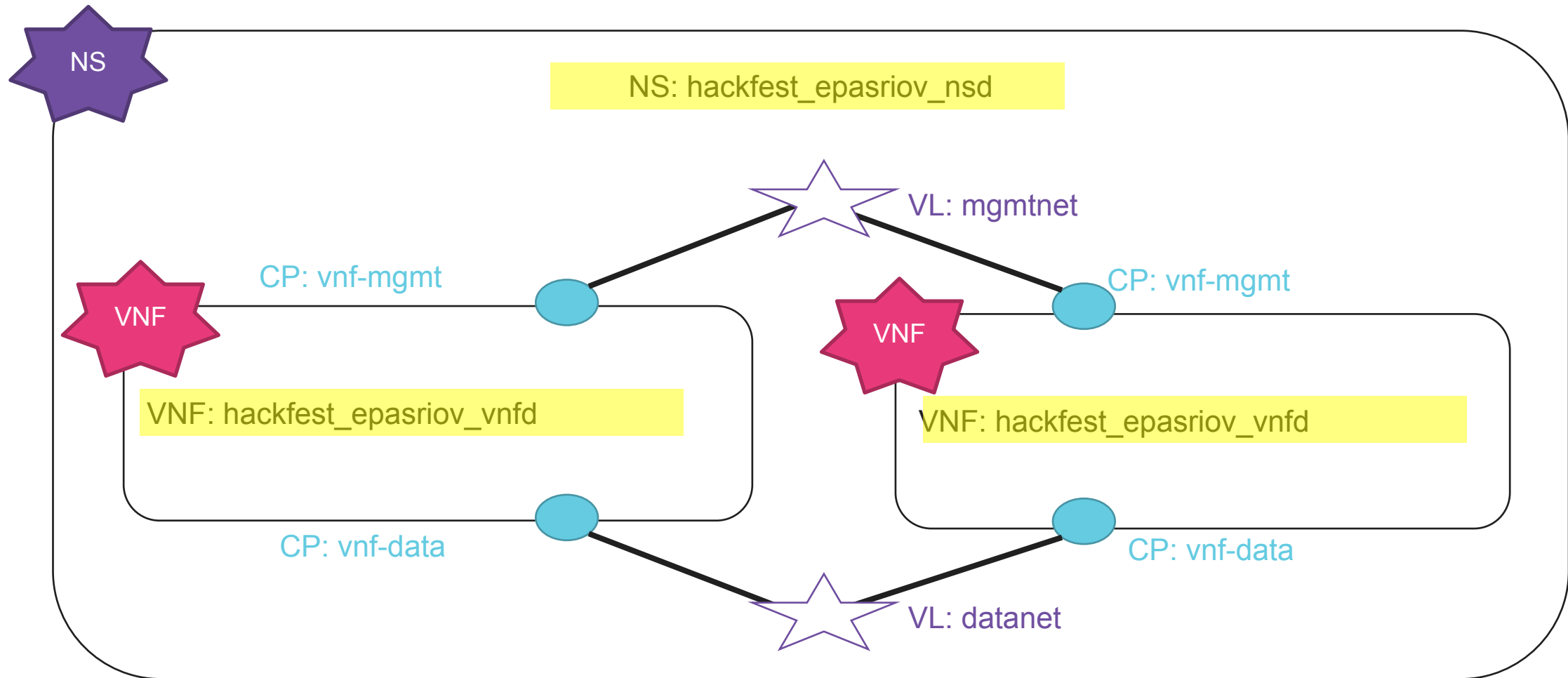
```
guest-epa:
 cpu-pinning-policy: DEDICATED
 cpu-thread-pinning-policy: PREFER
 mempage-size: LARGE
 numa-node-policy:
 mem-policy: STRICT
 node-cnt: '1'
 node:
 - id: '1'
```

And finally, this is the sample file: Hackfest EPA SRIOV VNF Descriptor

[https://osm-download.etsi.org/ftp/osm-6.0-six/7th-hackfest/packages/hackfest\\_epasriov\\_vnf.tar.gz](https://osm-download.etsi.org/ftp/osm-6.0-six/7th-hackfest/packages/hackfest_epasriov_vnf.tar.gz)



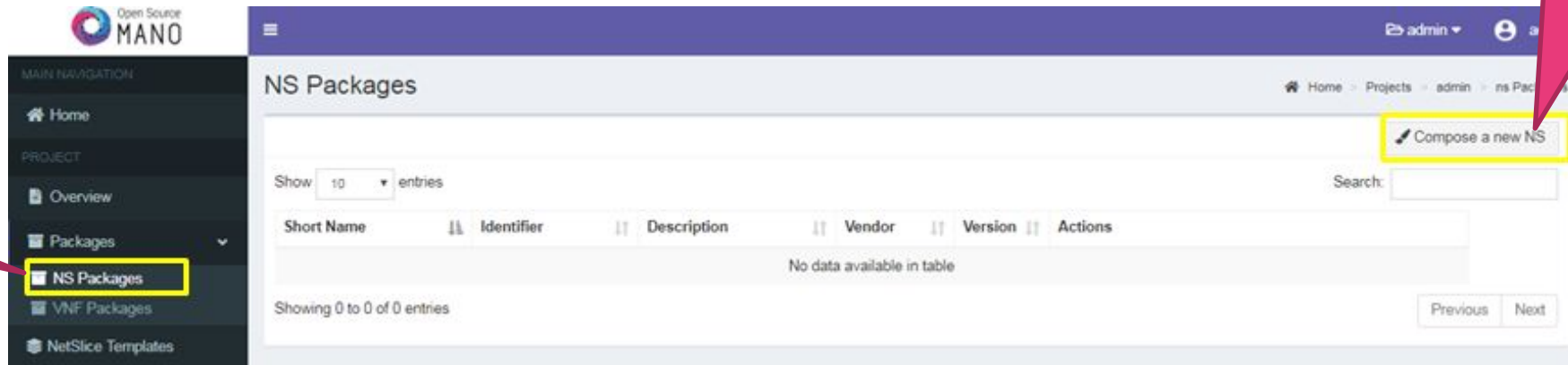
# NS diagram - Changes highlighted in yellow



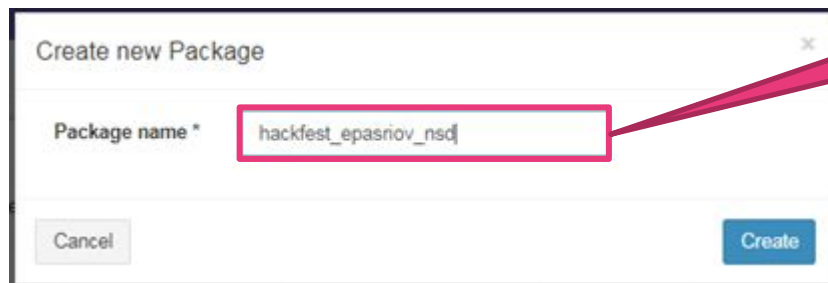
# User Interface

- Steps:

- Compose a new NS



- Create new Package



Create new Package

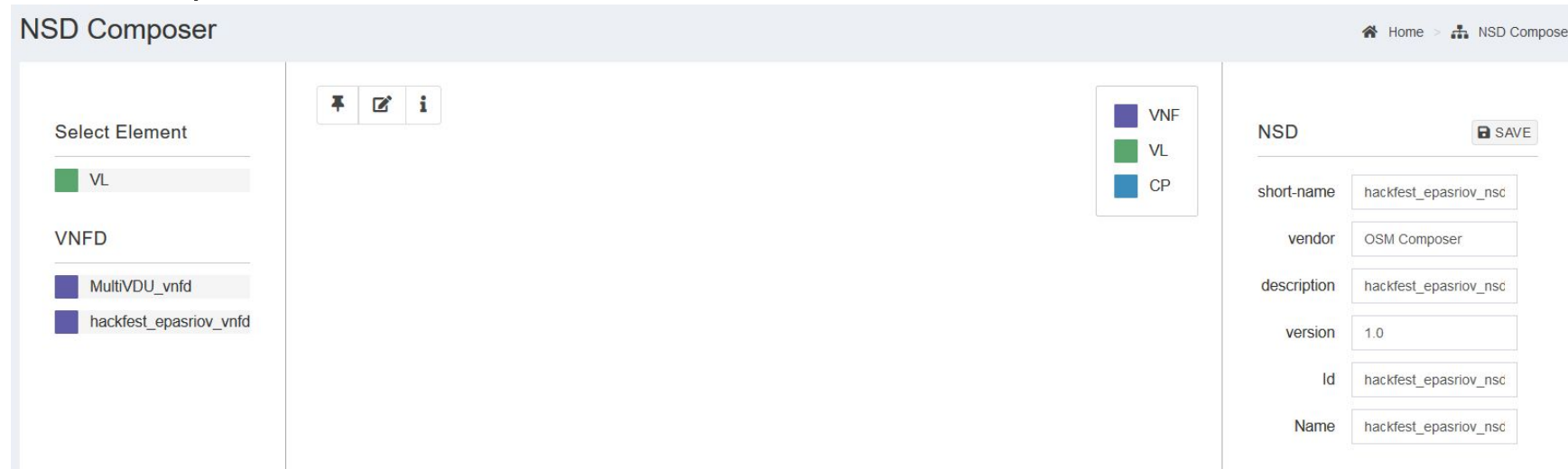
Package name \*

Cancel Create

hackfest\_epasriov\_nsd

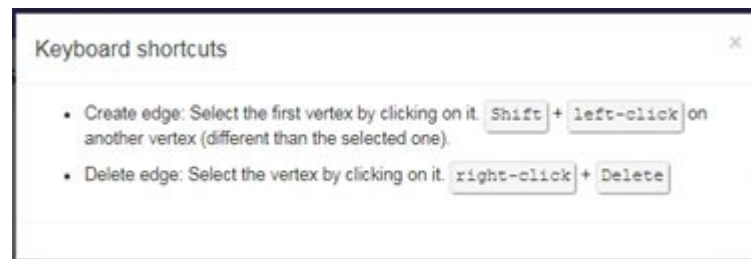
## ● Steps

### ○ NSD Composer



The screenshot shows the NSD Composer web interface. The main workspace is empty. On the left, there is a 'Select Element' panel with a 'VL' button. Below it, under 'VNFD', there are two buttons: 'MultiVDU\_vnfd' and 'hackfest\_epasriov\_vnfd'. In the center, there are three icons: a pin, a pencil, and an information icon. On the right, there is a legend with three colored squares: a purple square for 'VNF', a green square for 'VL', and a blue square for 'CP'. To the far right, there is a 'NSD' configuration panel with a 'SAVE' button and several input fields: 'short-name' (hackfest\_epasriov\_nsc), 'vendor' (OSM Composer), 'description' (hackfest\_epasriov\_nsc), 'version' (1.0), 'Id' (hackfest\_epasriov\_nsc), and 'Name' (hackfest\_epasriov\_nsc).

### ○ Keyboard shortcuts





The screenshot shows a 'Keyboard shortcuts' dialog box with a close button (X) in the top right corner. It contains two bullet points:

- Create edge: Select the first vertex by clicking on it. `Shift + left-click` on another vertex (different than the selected one).
- Delete edge: Select the vertex by clicking on it. `right-click + Delete`

# Creating the NSD (1/2)

## ● Steps

- Select VNFs:  `hackfest_epasriov_vnfd:1`  `hackfest_epasriov_vnfd:2` (Drag and drop)

| VNF                                | VNF                                |
|------------------------------------|------------------------------------|
| member-vnf-index 1                 | member-vnf-index 2                 |
| vnfd-id-ref hackfest_epasriov_vnfd | vnfd-id-ref hackfest_epasriov_vnfd |

- Create VLs:  `mgmtnet`  `datanet` (Drag and drop)

Virtual Link

|                  |                                      |
|------------------|--------------------------------------|
| Vim network name | <input type="text" value="osm-ext"/> |
| Name             | <input type="text" value="mgmtnet"/> |
| Mgmt network     | <input type="text" value="true"/>    |
| Type             | <input type="text" value="ELAN"/>    |
| Id               | <input type="text" value="mgmtnet"/> |

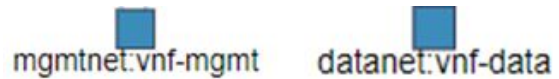
Virtual Link

|                  |                                      |
|------------------|--------------------------------------|
| Vim network name | <input type="text"/>                 |
| Name             | <input type="text" value="datanet"/> |
| Mgmt network     | <input type="text" value="false"/>   |
| Type             | <input type="text" value="ELAN"/>    |
| Id               | <input type="text" value="datanet"/> |

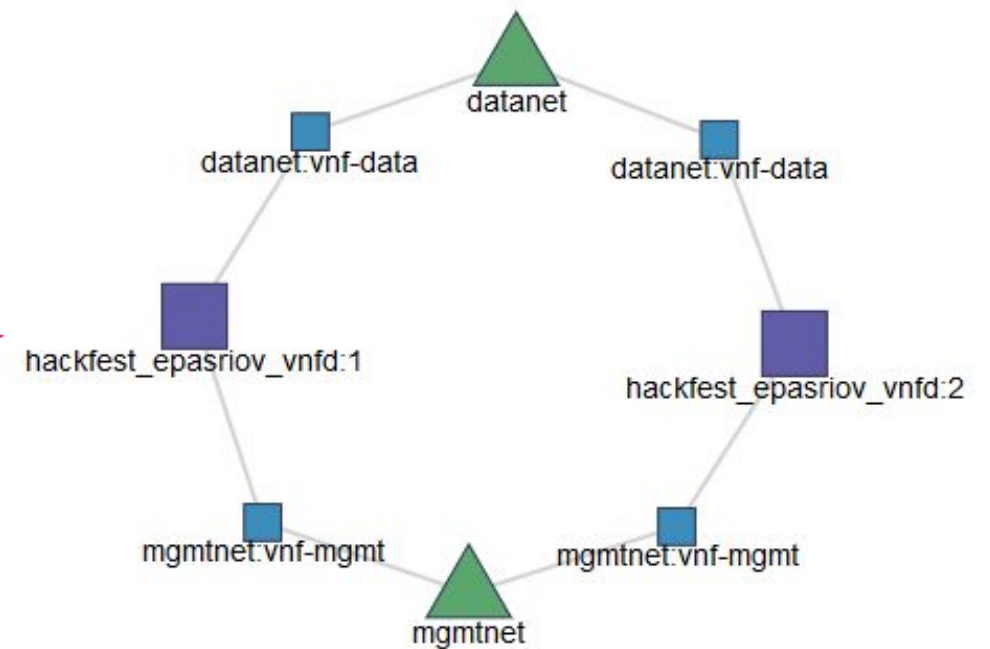
# Creating the NSD (2/2)

- Steps

- Link VLs with VNFs (Shift + Left Click)
  - Select the name for the CPs (vnf-data and vnf-mgmt)



- Final Scenario



And finally, this is the sample file: Hackfest EPA SRIOV NS Descriptor

[https://osm-download.etsi.org/ftp/osm-6.0-six/7th-hackfest/packages/hackfest\\_epasriov\\_ns.tar.gz](https://osm-download.etsi.org/ftp/osm-6.0-six/7th-hackfest/packages/hackfest_epasriov_ns.tar.gz)

# Deploying NS in the UI (1/4)

- Onboard VNFD and NSD to catalog using the UI
- Launch the NS from the UI
  - Depending on the VIM, specify a VIM network name to map **mgmtnet**
  - If you need to change the VIM, change the network name using config:  

```
{vld: [{name: mgmtnet, vim-network-name: osm-ext}]}
```
- Click the info button to see the mgmt IP address of each VNF
- Connect to management VNF:
  - `ssh osm@<IP>`
    - password: `osm4u`

# Deploying NS in the UI (2/4)

- There are several methods to check if the NUMA and HugePages was applied. We are going to show one method. This is to check the Openstack Flavors assigned to the created VM.
- List the servers: `openstack server list`

```
-----+-----+-----+-----+
| ID | Name | Status | Networks |
-----+-----+-----+-----+
76a01cc4-e8df-4d63-a8e6-b1a6a1e40576	epa_test-2-dataVM-1	ACTIVE	epa_test-datanet=192.168.255.10; epa_test-internal=192.168.101.13
5f1a94dc-12a6-4b71-83a9-417236525374	epa_test-2-mgmtVM-1	ACTIVE	osm-ext=172.21.248.114; epa_test-internal=192.168.101.5
e03b91f7-ef94-4fad-9caf-2ea80b37befe	epa_test-1-dataVM-1	ACTIVE	epa_test-datanet=192.168.255.2; epa_test-internal=192.168.150.6
0162b119-5509-4875-9615-081936066186	epa_test-1-mgmtVM-1	ACTIVE	osm-ext=172.21.248.129; epa_test-internal=192.168.150.13
-----+-----+-----+-----+
```

# Deploying NS in the UI (3/4)

- Show one of the mgmt servers

```
openstack server show <mgmt_server_uuid>
```

- Show the flavor of the server

```
openstack flavor show <mgmt_server_flavor_uuid>
```

| Field                      | Value                                |
|----------------------------|--------------------------------------|
| OS-FLV-DISABLED:disabled   | False                                |
| OS-FLV-EXT-DATA:ephemeral  | 0                                    |
| disk                       | 10                                   |
| id                         | 4c638a3c-f82a-48a1-85dd-c2d3e8c7c8e8 |
| name                       | mgmtVM-flv-16                        |
| os-flavor-access:is public | True                                 |
| properties                 |                                      |
| ram                        | 1024                                 |
| rxtx_factor                | 1.0                                  |
| swap                       |                                      |
| vcpus                      | 1                                    |



# Deploying NS in the UI (4/4)

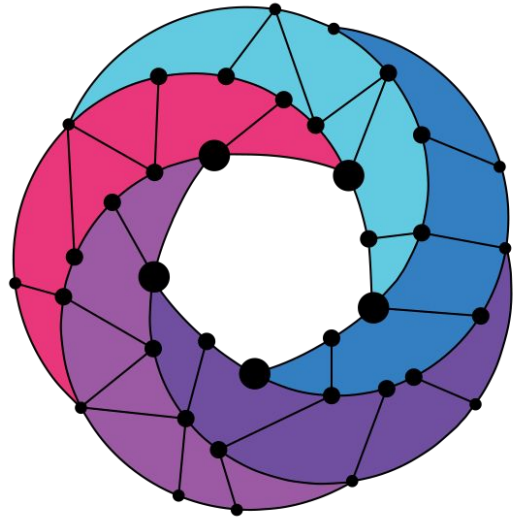
- Show one of the data servers

```
openstack server show <data_server_uuid>
```

- Show the flavor of the server

```
openstack flavor show <data_server_flavor_uuid>
```

| Field                      | Value                                                                                                                                                 |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| OS-FLV-DISABLED:disabled   | False                                                                                                                                                 |
| OS-FLV-EXT-DATA:ephemeral  | 0                                                                                                                                                     |
| disk                       | 10                                                                                                                                                    |
| id                         | 484e48ad-9ced-4a99-b6a0-af2fe803e502                                                                                                                  |
| name                       | dataVM-flv-16                                                                                                                                         |
| os-flavor-access:is_public | True                                                                                                                                                  |
| properties                 | hw:cpu_policy='dedicated', hw:cpu_sockets='1', hw:cpu_thread_policy='prefer', hw:mem_page_size='large', hw:numa_mempolicy='strict', hw:numa_nodes='1' |
| ram                        | 1024                                                                                                                                                  |
| rxtx_factor                | 1.0                                                                                                                                                   |
| swap                       |                                                                                                                                                       |
| vcpus                      | 4                                                                                                                                                     |



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