OSM Hackfest – Session 4.2
Modeling EPA capabilities: SR-IOV

Gianpietro Lavado (Whitestack)
What is SR-IOV?

**SR-IOV** allows VNFs to have direct access to a virtualized PCI of a NIC, thus giving it better throughput.

**Note:** Enabling SR-IOV requires a node reload for reconfiguration of the IOMMU virtualization mode. It also requires physical interfaces to be dedicated to this feature.
SR-IOV + SDN Assist: Enabling the chaining of high performance VNFs

1. OSM orquestrates SR-IOV
   → Proper assignment of I/O physical interfaces to the VM (VFs = Virtual Functions)

1. OSM SDN Assist gives the ability to create L2 connections between VFs
   • Interconnecting VMs
   • Attaching external traffic sources

Feature 5953 at REL7 will implement higher level protocols
Typical steps for enabling SR-IOV in an x86 compute node, include:

1. Activate IOMMU (Grub), SR-IOV and Intel-VTd (BIOS)
2. Configure the VFs that your NICs will support (CLI)
3. Install the SR-IOV Agent at OpenStack
4. Change Nova configuration to whitelist the NIC(s)
5. Enable SR-IOV at ML2 (Neutron) configuration
6. Map the physnet names to NICs in the SR-IOV agent configuration.

Reference: https://docs.openstack.org/neutron/rocky/admin/config-sriov.html
Provisioning SR-IOV with OpenStack

1. Create a network that uses the SR-IOV physnet
   ```
   openstack network create --provider-network-type=vlan
   --provider-physical-network=physnet2 --provider-segment=110
   sriov-vlan110
   ```

1. Create the corresponding subnet
   ```
   openstack subnet create --no-dhcp --network=sriov-vlan110
   --subnet-range=11.0.0.0/24 sriov-vlan110-subnet
   ```

1. Create a port with the direct binding at the subnet
   ```
   openstack port create --network sriov-vlan110 --vnic-type=direct
   --binding-profile trusted=true sriov-vlan110-port01
   ```

1. Launch the VM using that port
   ```
   openstack server create --flavor m1.large --image bionic --nic
   port-id=sriov-vlan110-port01 vm01
   ```

1. Repeat as needed, then configure the switches

Automating SR-IOV connectivity for the complete NS with OSM

1. Add the VIM that includes the physnet (once)
   ```
   osm vim-create --name VIMSRIOV --user user --password password
   --auth_url http://172.21.7.5:5000/v3
   --tenant tenant --account_type openstack
   --config '{dataplane_physical_net: physnet2, microversion: 2.32}'
   ```

1. Model your VNF(s) to use SR-IOV instead of VIRTIO
   ```
   interface:
   -   name: dataVDU
       type: EXTERNAL
   virtual-interface:
       type: SR-IOV
   ```

1. Launch your NS, OSM will take care of everything, including
   VLD interconnectivity if the fabric was pre-configured with SDN Assist.

More info on SDN Assist:
https://osm.etsi.org/wikipub/index.php/EPA_and_SDN_assist

Note: In all cases, the image you use should have the driver for supporting the physical NIC
A basic example of SR-IOV in OSM

You could clone the Hackfest-basic as the baseline for building:

vnfd:vnfd-catalog:
  vnfd:
    - connection-point:
      - name: vnf-cp0
      - name: vnf-cp1
    id: hackfest_base-vnf-sriov
  mgmt-interface:
    cp: vnf-cp0
  vdu:
    - cloud-init-file: cloud.config
      count: '1'
      id: hackfest_basic-VM
      image: bionic_wsvf
      interface:
        - external-connection-point-ref: vnf-cp0
          name: vdu-eth0
          type: EXTERNAL
        - external-connection-point-ref: vnf-cp1
          name: vdu-eth1
          type: EXTERNAL
    virtual-interface:
      type: SR-IOV
      name: hackfest_basic-VM
  vm-flavor:
    memory-mb: '2048'
    storage-gb: '30'
    vcpu-count: '2'

nsd:nsd-catalog:
  nsd:
    - constituent-vnfd:
      - member-vnf-index: '1'
        vnfd-id-ref: hackfest_base-vnf-sriov
      id: hackfest_base-ns-sriov
    name: hackfest_base-ns-sriov
    version: '1.0'
    vld:
      - id: mgmtnet
        mgmt-network: 'true'
        name: mgmtnet
        short-name: mgmtnet
        type: ELAN
        vim-network-name: management
        vnfd-connection-point-ref:
          - member-vnf-index-ref: '1'
            vnfd-connection-point-ref: vnf-cp0
            vnfd-id-ref: hackfest_base-vnf-sriov
      - id: sriov_vld
        name: sriov_vld
        short-name: sriov_vld
        type: ELAN
        vnfd-connection-point-ref:
          - member-vnf-index-ref: '1'
            vnfd-connection-point-ref: vnf-cp1
            vnfd-id-ref: hackfest_base-vnf-sriov

http://osm-download.etsi.org/ftp/osm-6.0-six/8th-hackfest/packages/hackfest-basic-vnf-sriov.tar.gz

http://osm-download.etsi.org/ftp/osm-6.0-six/8th-hackfest/packages/hackfest-basic-ns-sriov.tar.gz
Demo time!