Deploying OVN on Windows with OpenStack and Kubernetes

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Part 1

Deploying an OpenStack environment using OVN and networking-ovn
Quick recap on Neutron

Majority of implementations consist of Python agents, which have several drawbacks:
+ Takes a toll on messaging broker;
+ It requires advanced networking services;
+ It uses namespaces to provision the network.

The new proposed implementation OVN (Open Virtual Network) tackles a few shortcomings:
+ Built in advanced services;
+ Uses a database model instead of an RPC model.
Networking without OVN

- neutron-server
- rabbitmq
  - OVS agent
  - L3 agent
  - DHCP agent
  - Adv. services
Networking with OVN

- neutron w/ neworking-ovn
- OVN Northbound DB
- OVN Southbound DB
- ovn-controller
- OVS
- ovn-controller
- OVS
- ovn-controller
- OVS
Adding a Windows node

+ Install using the MSI
+ This will create services for:

  • OVS:
    ovsdb-server;
    ovs-vswitchd.
    Datapath (Hyper-V vSwitch Forwarding Extension)

  • OVN
    ovn-controller.
Configuring a Windows Node

+ Enable the Hyper-V vSwitch extension
+ Start the OVS services.
+ Configure information for **ovn-controller**:
  
  - system-id
  - ovn-bridge
  - ovn-remote
  - ovn-nb
  - ovn-encap-ip
  - ovn-encap-type
Debugging OVN environments

+ Look into `ovn-northd`, `ovn-controller`, `ovs-vswitchd`, `ovsdb-server` logs
+ For logical flows, use `ovn-trace`
+ For physical flows, use `ovs-appctl ofproto/trace`
+ For in depth kernel flows, please use `ovs-dpctl`
+ Use packet sniffers to look what happens to a packet
Debugging OVS Windows specific problems

+ Look if services are running
+ Look if the OVS extension is enabled and running (on a single Hyper-V VMSwitch), you can also look into ovs-vswitchd logs
+ Look if OVN/OVS services are stalling
+ Look up the route table and change it accordingly to your setup
+ Verify general connectivity
+ Check tunneling IPs for connectivity
+ Update NIC drivers where applicable
Windows Datapath

+ Supports **GRE, GENEVE, STT, VXLAN** tunnels
+ Supports almost all of the matching flows
+ Supports the majority set actions
+ OVS bridges work the same as on Linux (since 2.7)
+ Supports multiple **VTEP**
+ Supports multiple **NICs**
+ Supports packet recirculation
Windows Datapath

**Conntrack (stateful firewalling)**
+ Supported on: ICMP, TCP, UDP, FTP
+ Support for NAT will be added soon added

**OVS/OVN Windows CI’s:**
+ Unit test: [http://64.119.130.115/ovs/](http://64.119.130.115/ovs/)
+ Neutron-ovs-agent: in house testing
+ Neutron networking-ovn: TBA
+ Datapath unit tests: TBA.
Windows Datapath

OVS Windows enhancements which will be added in the next release cycles:
+ Megaflows
+ IPv6 tunnels
+ IPv6 Conntrack
+ Performance improvements
Windows Datapath: Community

+ Currently, the most active devs are from VMware and Cloudbase Solutions
+ We welcome any new developers or reviewers on the Windows side
+ Patches can be sent at dev@openvswitch.org
+ Pull requests welcome on https://github.com/openvswitch/ovs
Part 2

Deploying an **Kubernetes** environment using **OVN** and **ovn-kubernetes**
Benefits of an OVN Kubernetes deployment

+ Hybrid deployments
  • Allows deployments with mixed Linux and Windows containers

+ Can be deployed on:
  • On premise (OpenStack, etc)
  • Azure
  • AWS
  • GCE

+ Deploying on hybrid clouds (use case video Azure + AWS)
History of OVN with Kubernetes

+ Initial PoC was done by Guru Shetty
+ Implemented CNI plugin
+ CNI (container network interface) is:
  • An abstraction model over networks;
  • Every provider can write a plugin;
  • Think about ML2 from Neutron.
OVN in Kubernetes

+ OVN provides agnostic virtualization to containers
+ It supports overlay
+ On Linux
  • Uses CNI plugin
  • Kubernetes will invoke the CNI
OVN in Kubernetes continued

+ On Windows:
  • CNI porting in progress (removing Linux dependencies)
  • PoC Python daemon:
    Listens to docker events
    Takes care of the setup
    We need to look inside the container
    Static MAC/IP defined in OVN.
Windows with OVN and Kubernetes

+ Container feature/Hyper-V feature enabled
+ Deploying:
  • Install OVS MSI;
  • Install Kubernetes binaries;
  • Setup variables.
+ Tutorial on GCE:
  • https://github.com/apprenda/kubernetes-ovn-heterogeneous-cluster
Windows with OVN and Kubernetes (continued)

+ **ovn-kubernetes** is the default for mixed environments
+ More tutorials will be added
+ CNI is moving under CNCF
+ Community effort: #sig-windows community, Apprenda and authors from: https://github.com/apprenda/kubernetes-ovn-heterogeneous-cluster
Demo
Useful links

Where to download OVS/OVN distribution: http://openvswitch.org/download/; https://cloudbase.it/openvswitch/ (includes signed drivers!)
Where to report bugs and ask questions: bugs@openvswitch.org, ovs-discuss@openvswitch.org, https://ask.cloudbase.it, https://github.com/openvswitch/ovs-issues

ovn-kubernetes: https://github.com/openvswitch/ovn-kubernetes (Python/GO)
Heterogenus Kubernetes cluster: https://github.com/apprenda/kubernetes-ovn-heterogeneous-cluster (GCE deployment)

For help and questions you can ask on slack channel #sig-windows

Setup on public providers:
https://www.youtube.com/watch?v=lc6iuu-mvslw&list=PL3wS6qV9GtxeROM4AQX5pmfoMHQ0zKl0d
Questions?