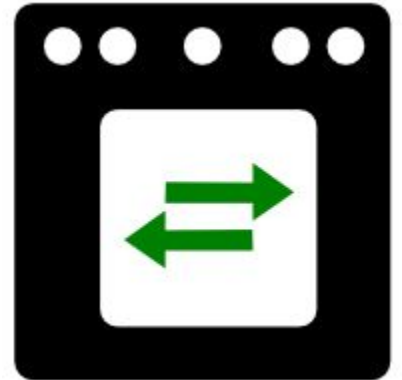


OVN: The Open Virtual Network for Open vSwitch

Russell Bryant (@russellbryant)

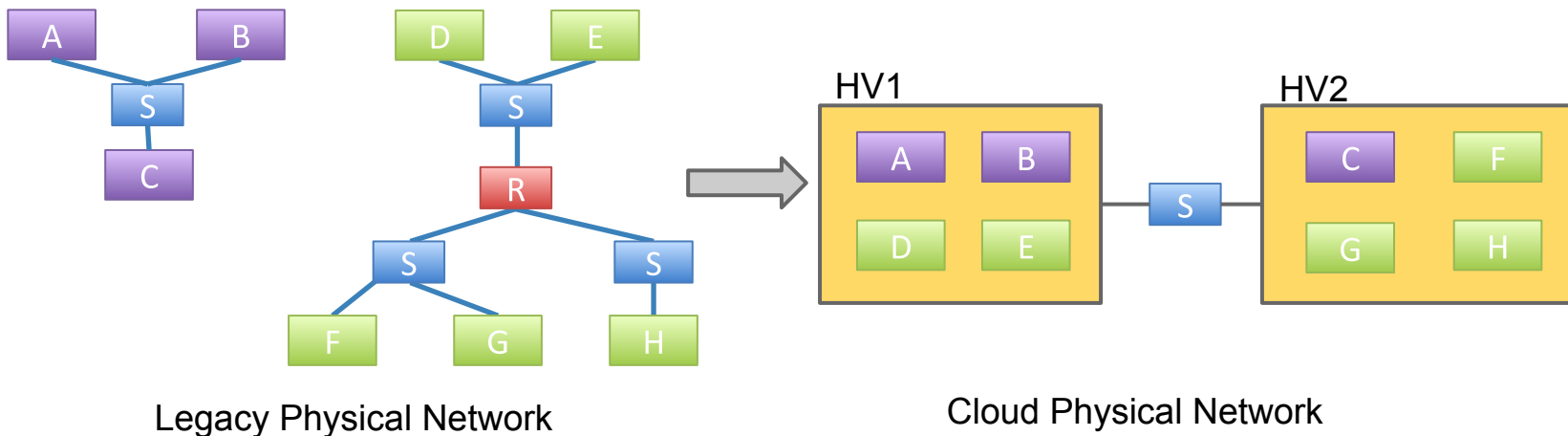
Justin Pettit (@Justin_D_Pettit)

Ben Pfaff (@Ben_Pfaff)



The Case for Network Virtualization

- Network provisioning needs to be self-service.
- Virtual network needs to be abstracted from physical.
- Virtual network needs same features as physical.

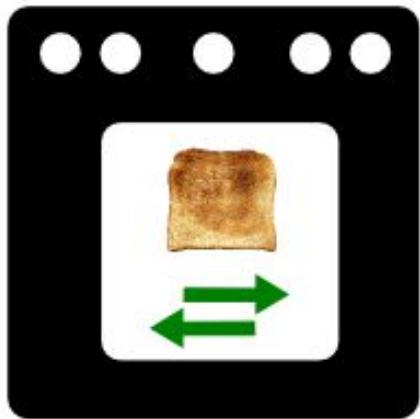


Why Start OVN?

- Virtual networking for OVS, done from scratch using experience built up in the OVS project
- Natural evolution of the project--OVS had only provided the components to build a distributed switch
- Cloud management systems agnostic

What is OVN?

- Open source L2/L3 network virtualization for Open vSwitch (OVS):
 - ✓ Logical switches
 - ✓ L2/L3/L4 ACLs (Security Groups)
 - ✓ Logical routers
 - ✓ Multiple tunnel overlays (Geneve, STT, and VXLAN)
 - ✓ TOR-based and software-based logical-physical gateways
- Works on same platforms as OVS:
 - ✓ Linux (KVM and Xen)
 - ✓ Containers (Docker)
 - ✓ DPDK
 - Hyper-V
- Integration with:
 - ✓ OpenStack Neutron
 - ✓ Docker
 - Other CMSes



The “Toaster Oven” Release

The Particulars

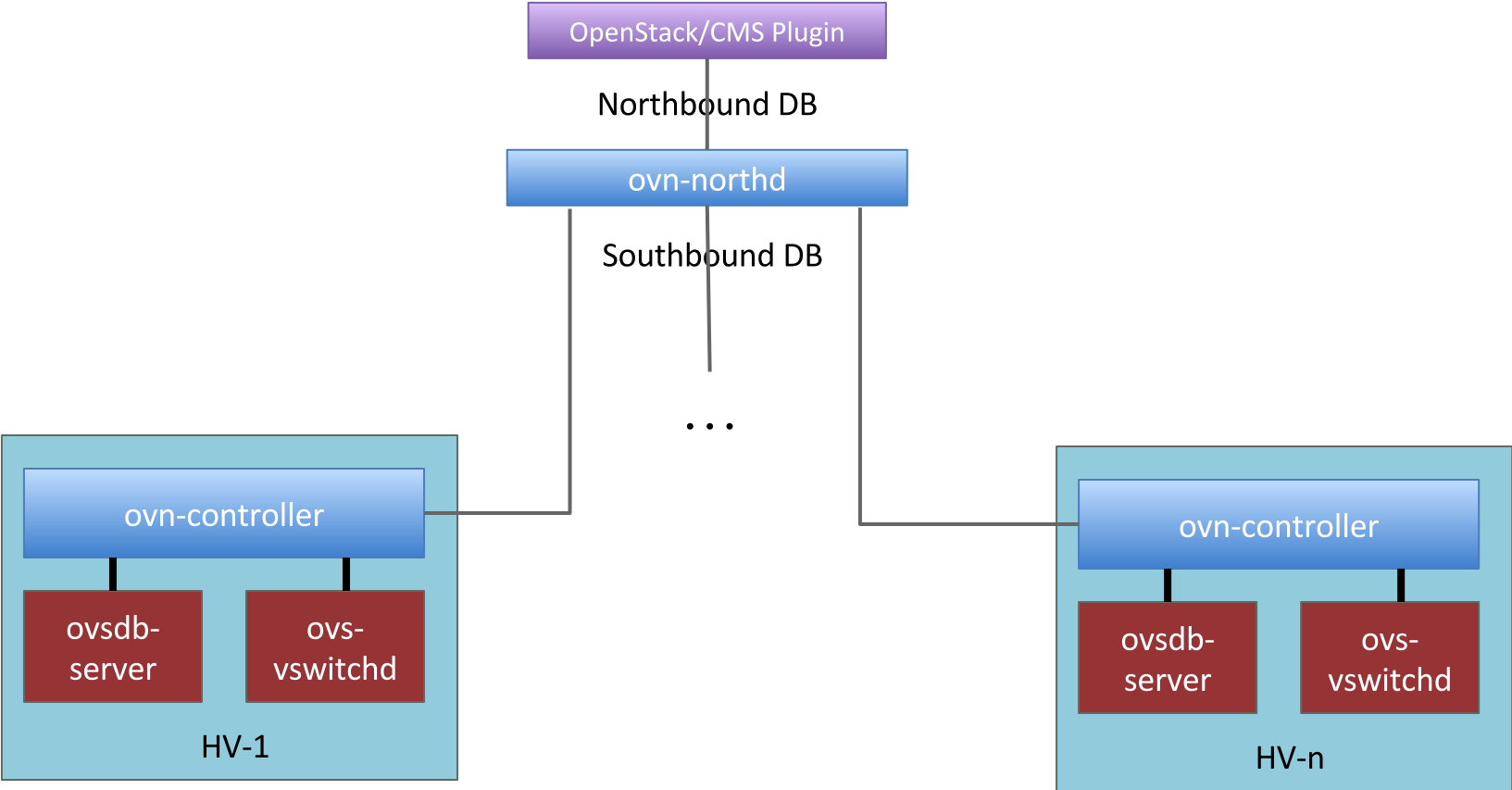
- Developed by the same community as Open vSwitch
- Vendor-neutral
- Design and implementation all occur in public
- Developed under the Apache license

Goals

- Production-quality
- Straightforward design
- Scale to 1000s of hypervisors (each with many VMs/containers)
- Improved performance and stability over existing OpenStack OVS plugin

How is OVN Different?

OVN Architecture

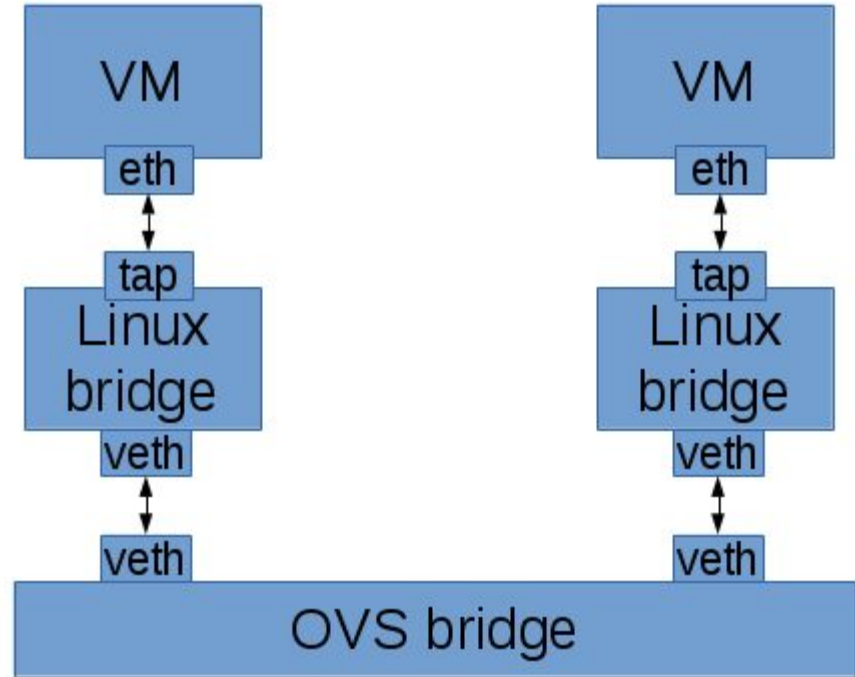


Architecture

- Configuration coordinated through databases
- Logical flows, don't worry about physical topology
- Local controller converts logical flow state into physical flow state
- Desired state clearly separated from run-time state
- Based on the architecture we wanted based on seeing a number of others using OVS

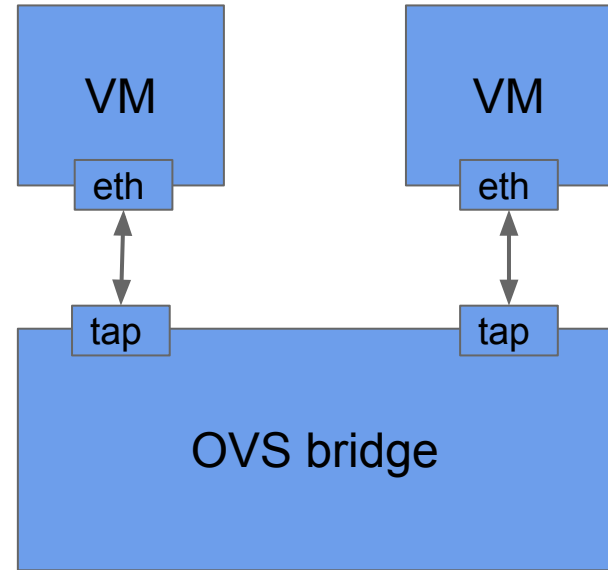
OpenStack Security Groups (Legacy)

- Required extra linux bridge and veth pair **per VM**
- Uses iptables



Security Groups (OVN ACLs)

- Uses kernel conntrack module directly from OVS
- Design benefits
 - No complicated pipeline
 - Faster* -- Fewer hops and veth ports



* <http://blog.russellbryant.net/2015/10/22/openstack-security-groups-using-ovn-acls/>

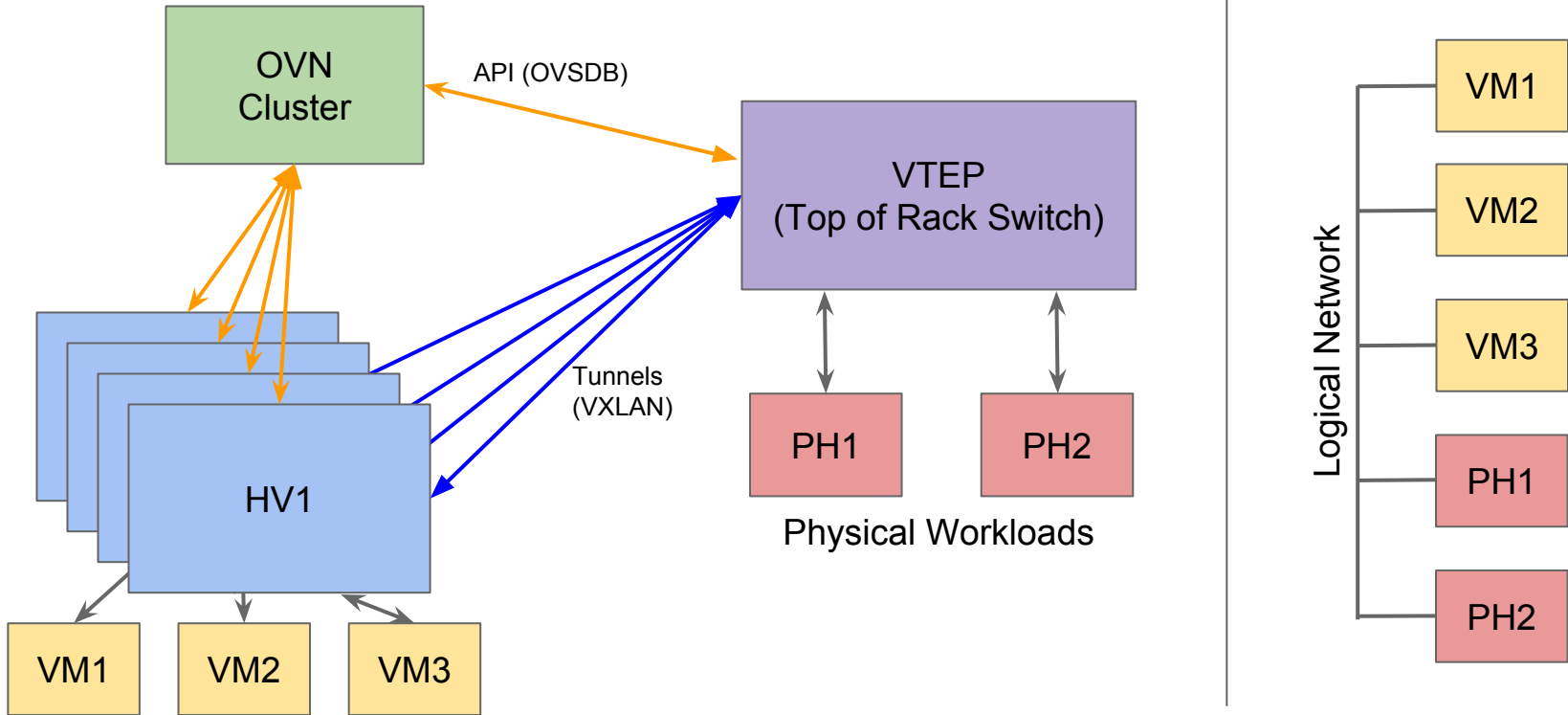
OVN L3 Design

- Native support for IPv4 and IPv6
- Distributed
- ARP/ND suppression
- Flow caching improves performance
 - Without OVN: multiple per-packet routing layers
 - With OVN: cache sets dest mac, decrements TTL
- No use of Neutron L3 agent

Gateways

- Based on “vtep” OVSDDB schema included with OVS
 - Hardware: Arista, Brocade, Cumulus, Dell, HP, Juniper, Lenovo
 - Software: Implement “vtep” schema in software, via DPDK
 - Will become a reference for building OVS DPDK applications
- Later: move beyond the capabilities of the “vtep” schema to support fail-over, scale-out, and more stateful services

Physical Workload Integration



Rolling Upgrades

- OVSDDB schema is versioned
- Changes to schema will be carefully managed to be backwards compatible
- Allows rolling upgrades
 - Update databases first
 - Roll through upgrades to ovn-controller
- Same strategy OVS itself has been using

Status

Upcoming Work in OVN

- NAT for OVS (patches available)
- Native DHCP support (patches available)
- Service Function Chaining (design in progress)
- Basic load balancing (required for Kubernetes)

Resources

- Architecture described in detail in ovn-architecture (5)
- Available in the “master” branch of the main OVS repo:
 - <https://github.com/openvswitch/ovs>
 - <http://openvswitch.org/support/dist-docs/>
- Neutron plugin in its own repo:
 - <https://git.openstack.org/openstack/networking-ovn.git>
- Neutron integration docs, including devstack instructions:
 - <http://docs.openstack.org/developer/networking-ovn/>

How you can help

- Try it! Test it! Write Code!
- Report bugs and try it at scale
- Core OVN is being developed on ovs-dev mailing list:
 - <http://openvswitch.org/pipermail/dev/>
 - #openvswitch on Freenode
- Neutron plugin for OVN is being developed here:
 - <http://git.openstack.org/openstack/networking-ovn.git>
 - openstack-dev mailing list
 - #openstack-neutron-ovn on Freenode

Thank you!

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