

# Nuage Networks - Integration with Cloud Management Platforms

Scott Sneddon, Nuage Networks  
Uli Hitzel, Red Hat

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# Agenda

Nuage VSP - Integrations with Cloud Management Systems

VMware | CloudStack | OpenStack

Red Hat & OpenStack

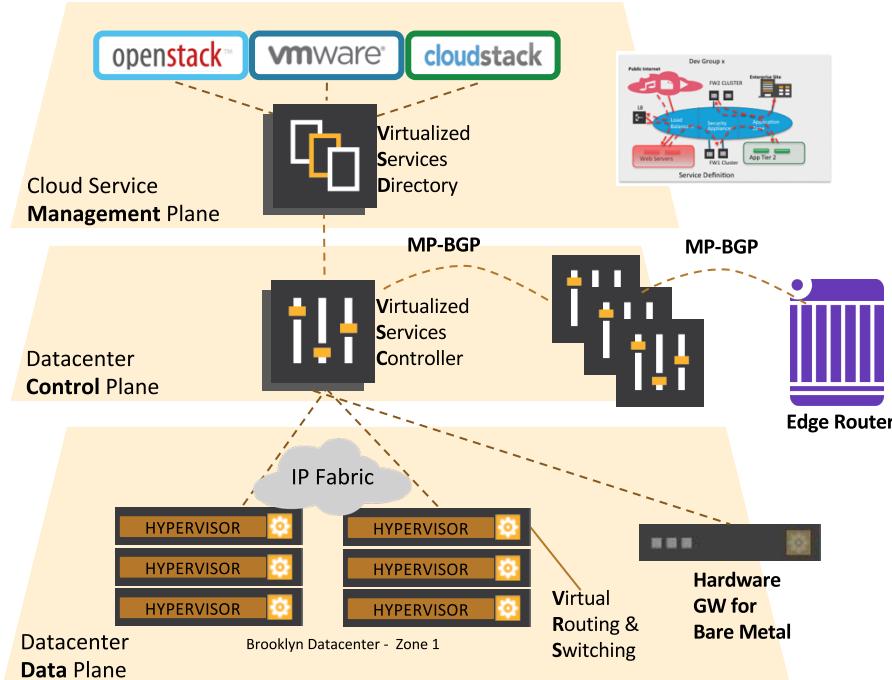
Introduction | Use Cases | Enterprise Product | Red Hat Cloud Infrastructure

Journey to a Hybrid Cloud

Evolving Workloads | Hybrid Cloud Platform | Adoption Paths

# Introduction / Overview

## CMS Integration with Nuage VSP



- Nuage VSP is tightly integrated with major cloud management systems
  - Hypervisor agnostic
  - Enables hybrid clouds
- Basic integration enables distributed virtual routing features within the cloud using CMS API/UI
- Advanced integration using REST API allows access to all of VSP's advanced networking features.

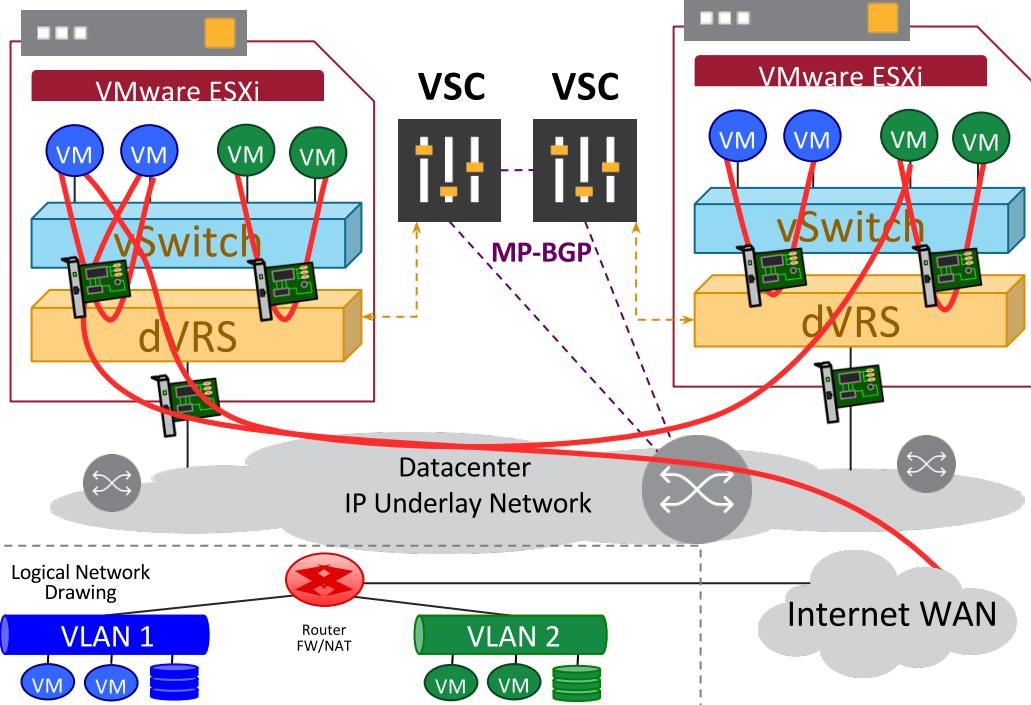
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Nuage VSP - Integrations with Cloud Management Systems  
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# VMware ESXi Integration

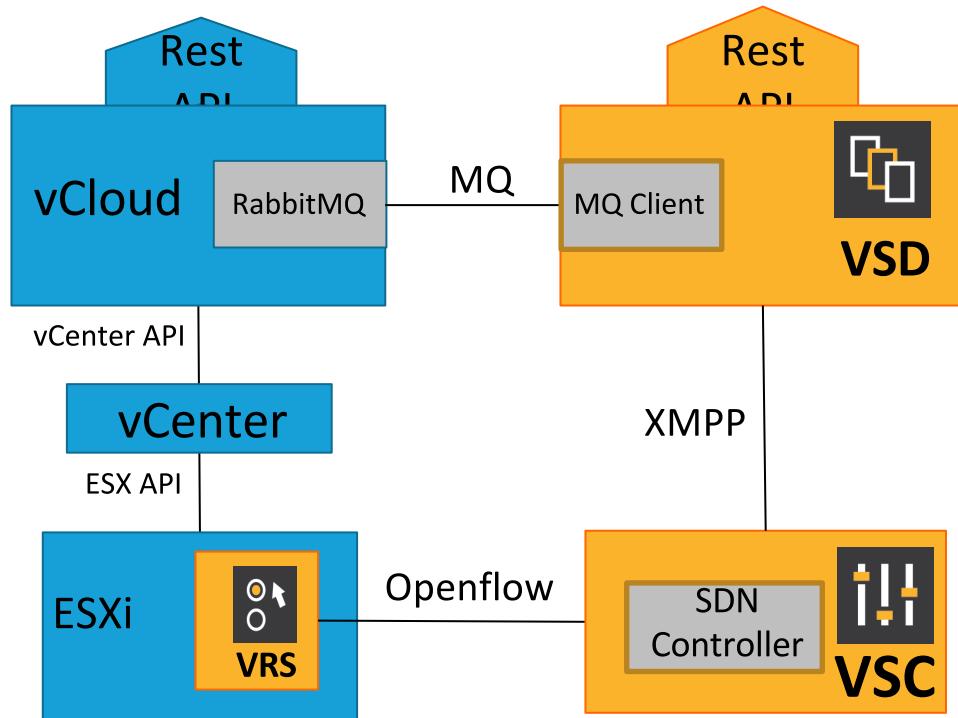


- dVRS appliance installed on-top of ESXi hypervisor as VM.
- Physical NICs are virtualized using SR-IOV technology and attached to dVRS
  - dVRS OVS becomes a driver between PCI device and VMware vSwitch.
  - No significant impact in performance – no memory copies
  - VMs can utilize existing drivers (VMXNET3)
- Provides full support for distributed routing and switching

# vCenter Integration

- No specific extensions needed
  - Go to Edit VM settings -> Options -> Advanced -> General -> Configuration Parameters
- Add Nuage metadata
  - nuage.enterprise = Enterprise name
  - Nuage.user = Enterprise user
  - Nuage.nic0.domain = Nuage domain
  - Nuage.nic0.zone = Nuage zone
  - Nuage.nic0.Iptype = ipv4
  - Nuage.nic0.network = Subnet name
- VRS vCenter Plugin
  - Queries VSD and allows user to select enterprise, domain, and subnet

# Nuage Networks & VMware vCloud Integration



- For every action in vCloud there is an event created on the message bus(MQ)
- Nuage workflow engine captures the event, and maps the corresponding entity in VSD
- VSD tracks the state of vCloud and adapts our structures accordingly
- Basic concepts:
  - vCloud is used with PortGroup backed networks
  - PortGroups must be generated in vSwitches with our scripts before attaching server to the vCloud domain
  - This is similar to the Cisco Nexus 1000v integration and NSX integrations.

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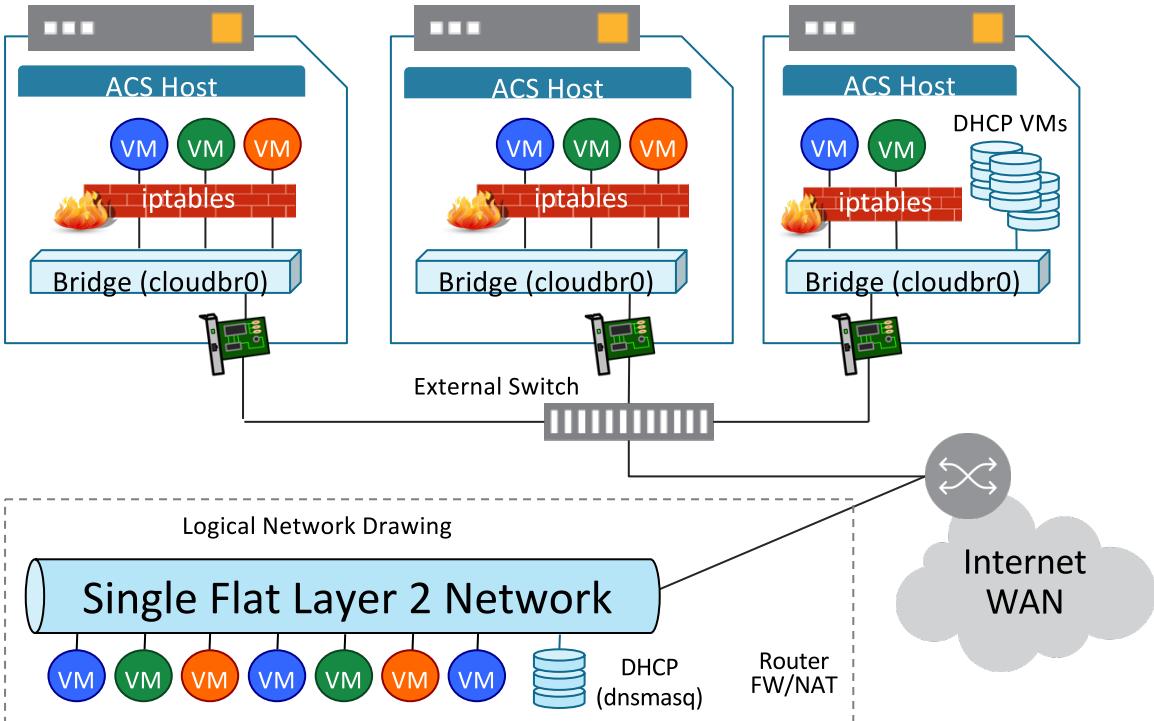
Red Hat & OpenStack

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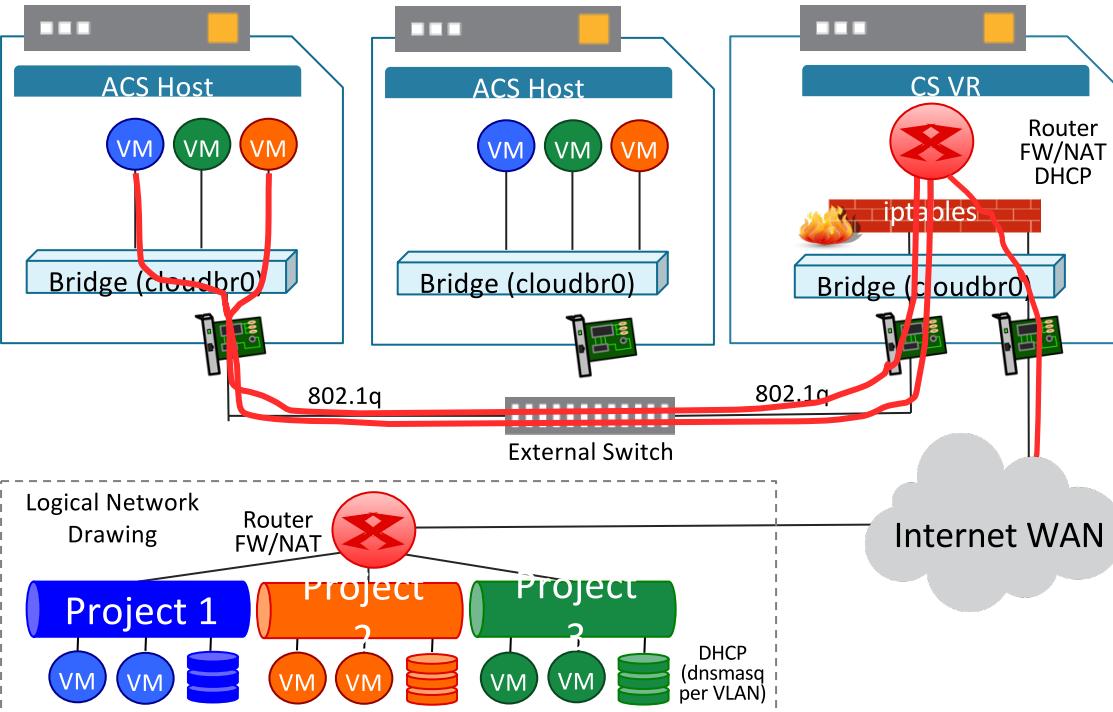
Evolving Workloads | Hybrid Cloud Platform | Adoption Paths

# Basic Networking in Cloud Stack



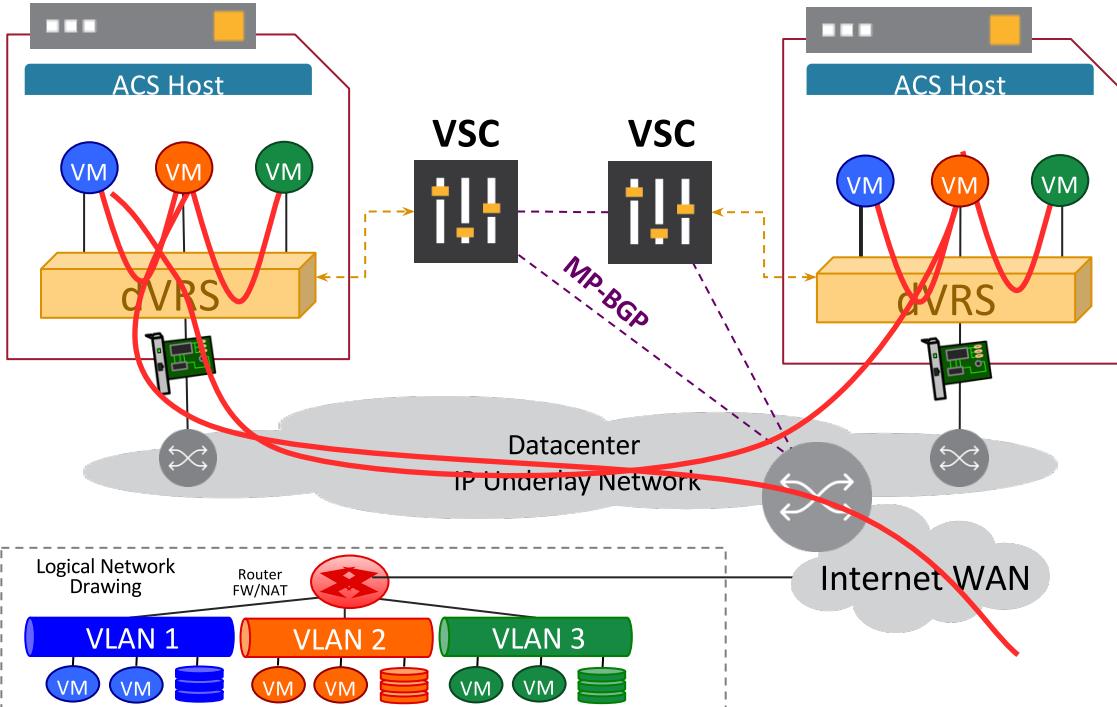
- Simple flat network – all VM's attached to a flat L2 network
- Multi-tenancy is provided using security groups
- Layer-3 Isolation - Proxy-ARP prevents spoofing.
- Directly connected to internet
- IP Address management provided by ACS DHCP Appliance

# VPC Networking in Cloud Stack



- Multiple subnets per tenant
- Multi-tenancy provided using VLANs
- Layer-3, DHCP, FW/NAT provided by CS Virtual Router
- Major bottleneck at CS VR
- CS VR uses CPU cycles that could be used for tenant VMs

# Advantages of Nuage CloudStack Solution



- No congestion issues

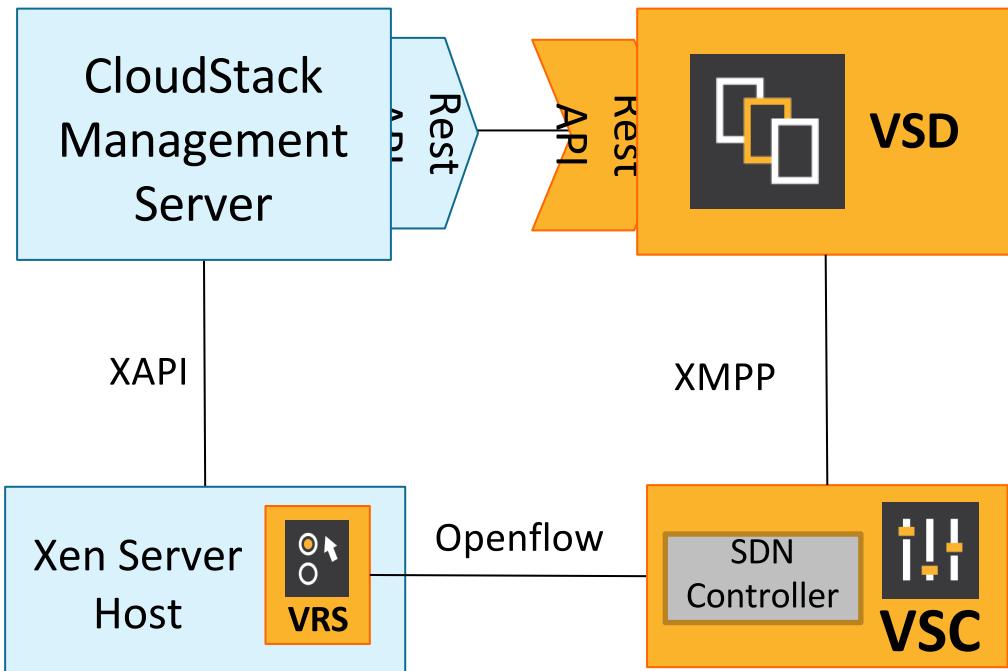
With VRS all traffic takes the **most optimal path** reducing congestion, lowering latency, and **providing consistent application performance**.

- Traffic between tiers (routed) can be switched locally keeping it off the network.
- Layer-3 traffic between VM's on different physical hosts is sent directly.
- External traffic is sent directly to a PE/GW router.

# VSP Cloud Stack Plugin

apachecloudstack<sup>™</sup>  
open source cloud computing

- Support for both Isolated Networks and Virtual Private Clouds (VPC)
- Services supported:
  - Static NAT
  - Firewall
  - DHCP
  - Network ACL
- ACS 4.3 with XenServer 6.2 AND ESXi 5.x supported in Nuage 3.0



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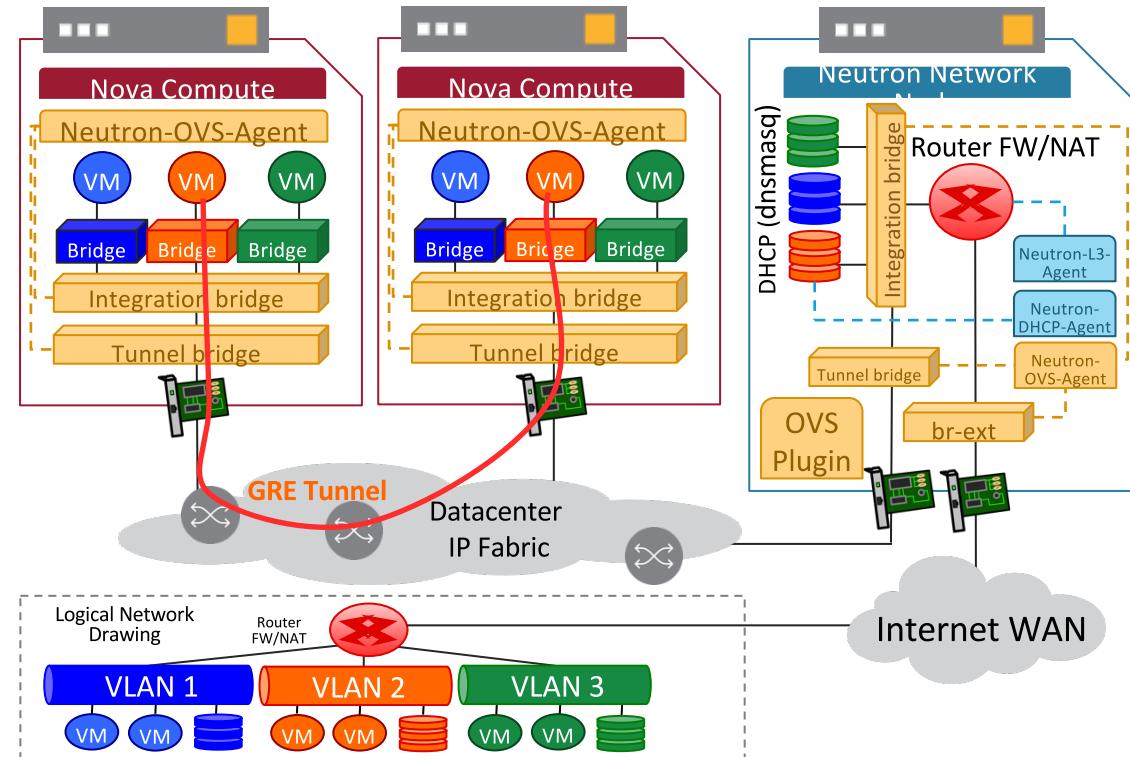
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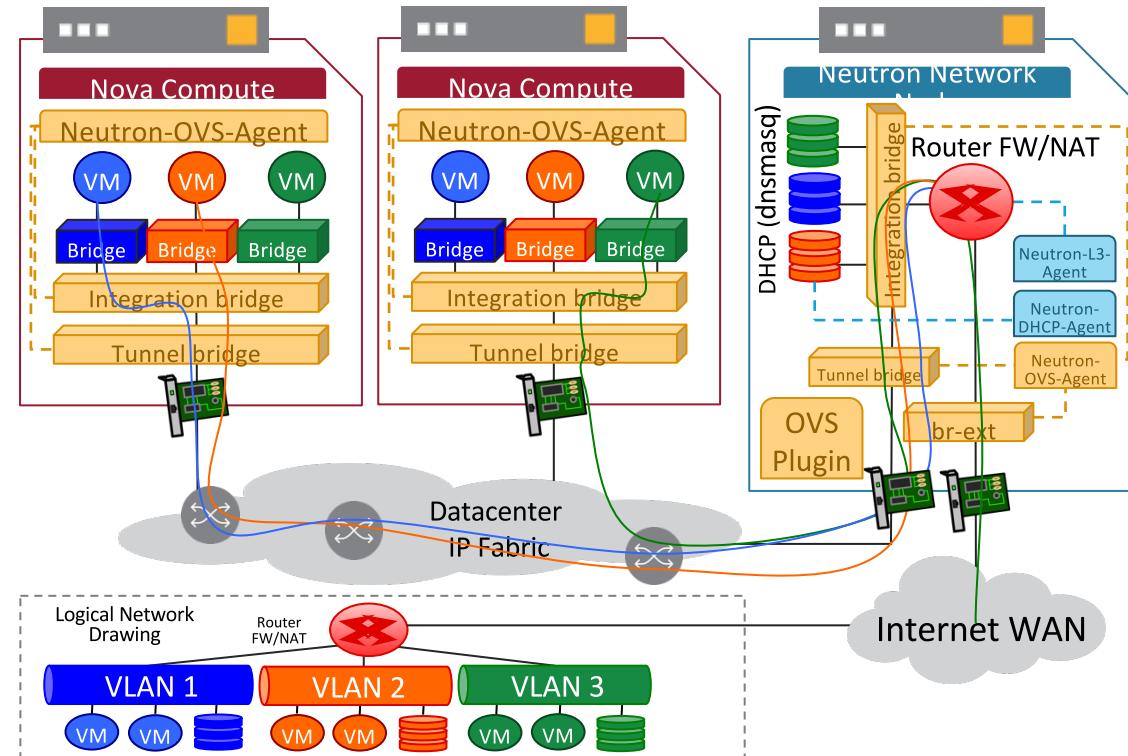
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# OpenStack Neutron Networking



- OVS Plugin programs Open vSwitches to create virtual layer-2 and layer-3 networks.
- Only requirement for physical network is IP connectivity for transport of GRE packets.
- DHCP servers and virtual routers (per subnet) are spun up on a neutron network node and patched in via GRE tunnels to compute node.

# OpenStack Neutron Architectural Gaps



- Congestion issues
  - External traffic
  - Traffic between subnets - such as traffic between application tiers
- Security groups (ipchains) require an additional linux bridge in between the VM and the integration bridge adding latency and reducing performance.

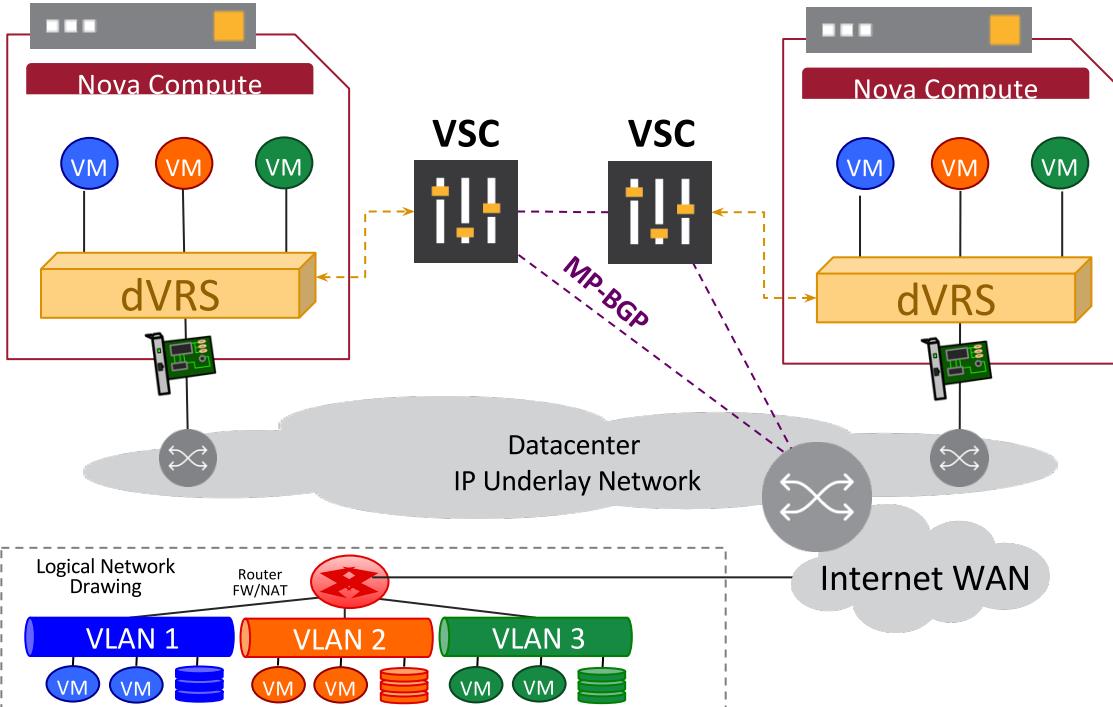


nuagenetworks

# Neutron Networking with Nuage VSP

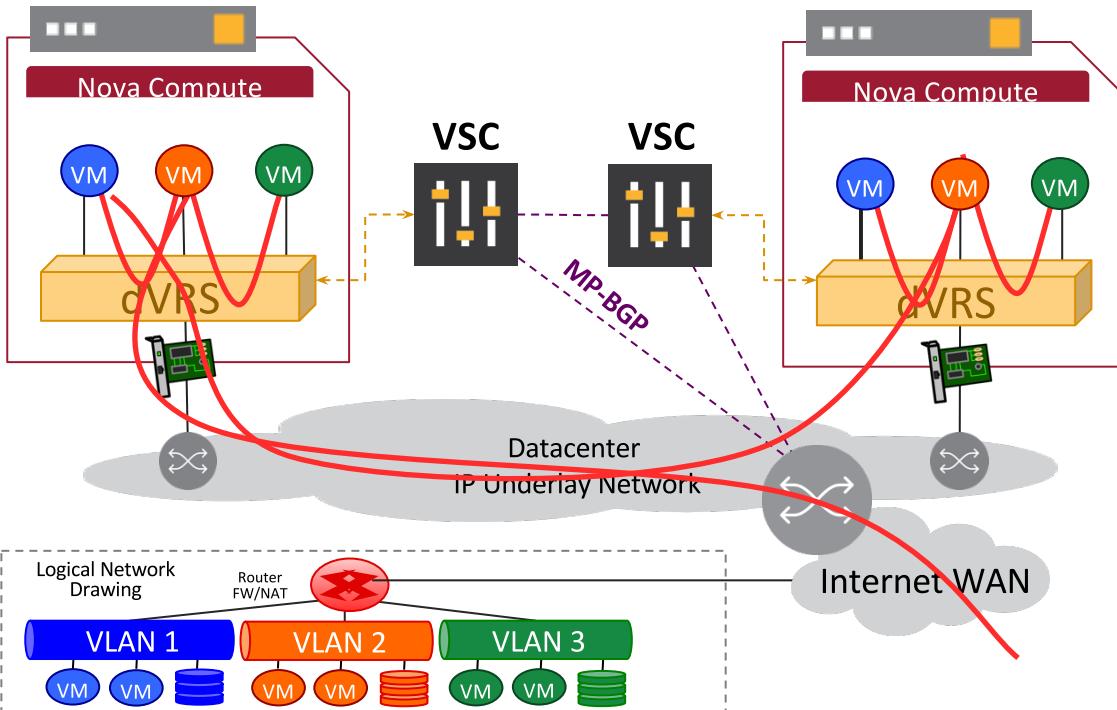
- Advanced capabilities only available with Nuage VSP
  - Fully distributed data-plane
    - VRS performs all routing and switching functions on the compute node preventing choke points and providing consistent performance.
  - Scalable control plane based on BGP
  - Seamless external access solutions
  - Enables hybrid cloud – Openstack can coexist with other CMS
  - Unique scalable solution for connectivity to non-virtualized servers

# Neutron with Nuage VSP Plugin



- Nuage VSP-Agent runs on every compute node along with the VRS forwarding plane.
- VRS provides routing, switching, filtering, and NAT on every compute node distributing the load to eliminate bottlenecks.
- VRS Uses VxLAN overlay to create virtual L2 and L3 networks. Only requirement is IP transport.

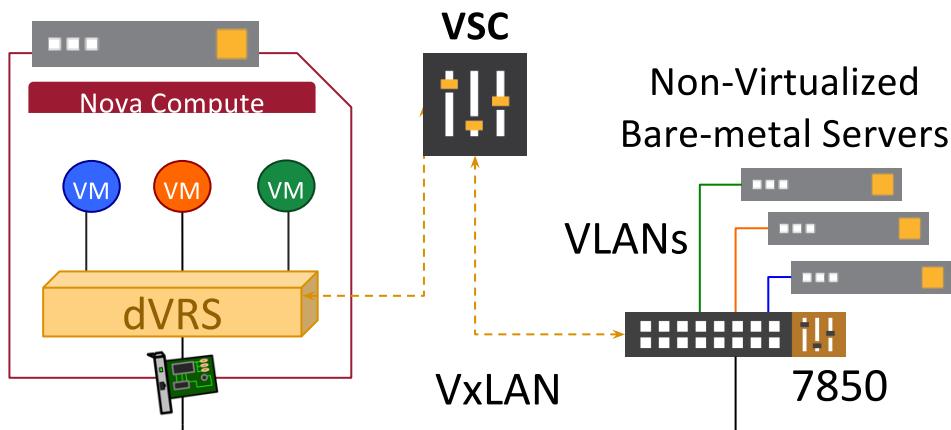
# Advantages of Nuage / Neutron Solution



- No congestion issues  
With VRS all traffic takes the **most optimal path** reducing congestion, lowering latency, and **providing consistent application performance**.
- Traffic between tiers (routed) can be switched locally keeping it off the network.
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# Nuage 7850 Virtualized Services Gateway (vSG)

- Unique solution for including non virtualized servers in an OpenStack cloud
- Greatly simplifies cloud deployments and migration



- 32-port 10GigE SFP+
- 16-port 40GigE QSFP+
- 1.92 Tb/s throughput (half-duplex)

# Nuage VSP Plugin for OpenStack Releases

- Public Nuage VSP plugin available in Icehouse distribution
- Private “enhanced” Nuage VSP plugin available directly from Nuage
  - Qualified by Nuage with Havana and Icehouse
- Enhanced Nuage VSP plugin will included in the Juno release

# OpenStack Integration Modes

## ▪ Basic Networking

- Supports existing OpenStack network abstractions
- All configuration performed via OpenStack APIs
- Configuration pushed to VSD by Nuage plugin

## ▪ Advanced

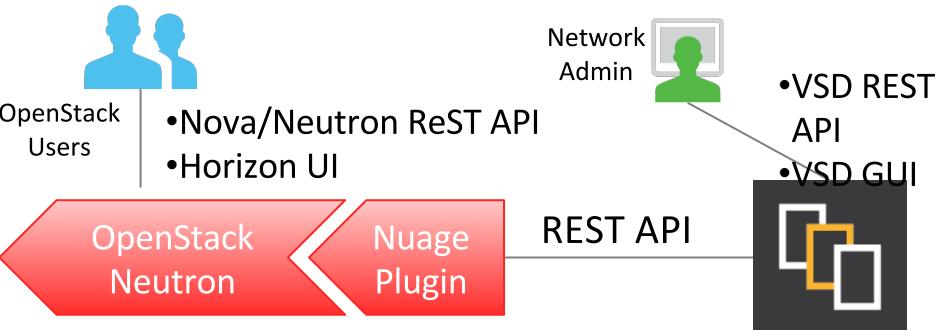
- Supports all VSD network abstractions (including those which do not exist today in OpenStack e.g. Service Chaining)
- Network configuration made via VSD UI or APIs
- Network admins create network objects/policies
- OpenStack users consume network capabilities
- VMs are attached to vPorts and Subnets by Nuage OpenStack plugin



## Basic Mode

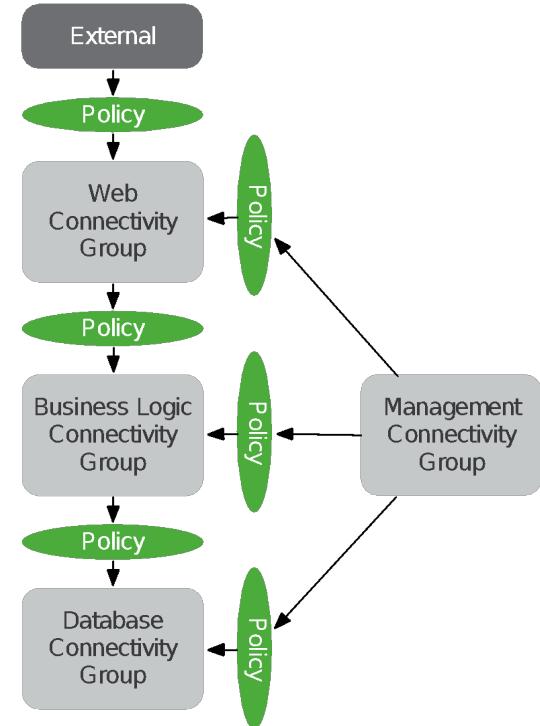
### VSD

## Advanced Mode



# Neutron Policy Abstractions

- Current Neutron API constructs map to legacy networks (port, subnet, router)
- Application Developers need more flexible and application-oriented interfaces
- Objectives:
  - Express connectivity of application components and policies governing connectivity
  - Provide flexible support for different cloud network technologies
- Collaborating with IBM, Cisco, Juniper, RedHat and others



# Conclusions

**Nuage VSP is tightly integrated with all of the leading cloud management systems.**

- Allows the creation of hybrid clouds
- Hypervisor agnostic

**Basic integration enables distributed virtual routing (SDN) within the cloud**

**Restful API enables easy programmatic access to advanced virtual network features**

- Service chaining, Templates, and Network Abstractions
- Advanced QoS

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# #1 OPEN SOURCE LEADER

MORE THAN  
**90%**  
of  
**FORTUNE  
500**  
COMPANIES  
use  
**RED HAT**

PRODUCTS &  
SOLUTIONS.\*



OFFICES WORLDWIDE

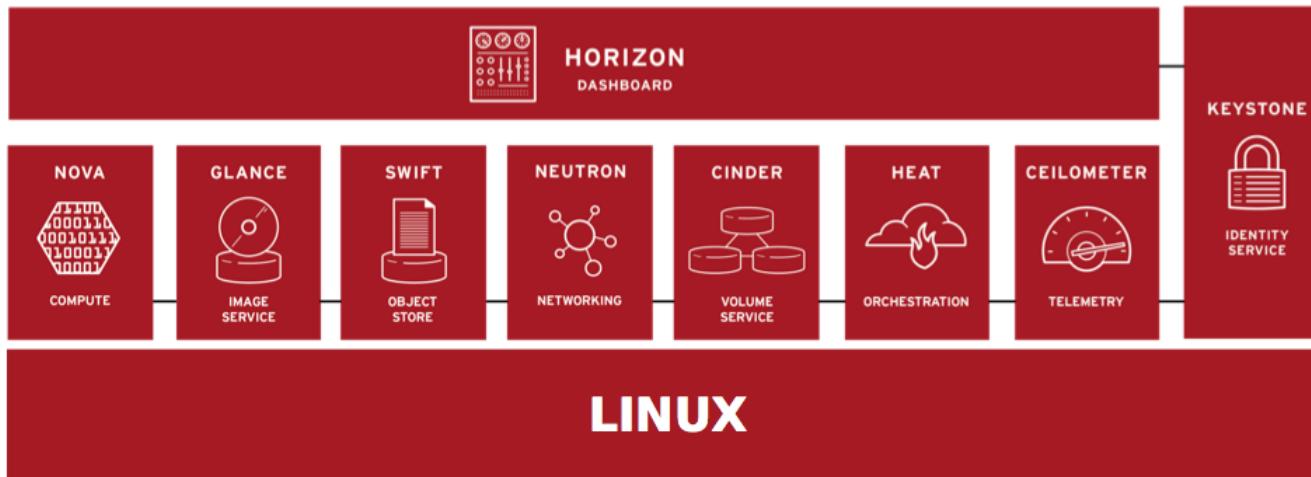


CEO JIM WHITEHURST



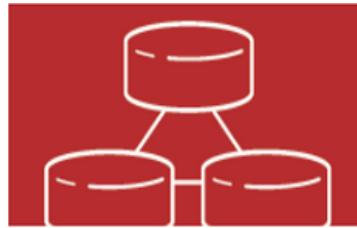
\* Red Hat client data, 2013

# OpenStack is based on Linux



- Modular, pluggable architecture
- Covers more than just compute
- Written in Python
- Leverages other open source projects like KVM, libvirt, SELinux, RabbitMQ

# OpenStack Use Cases



- Telco / ISP public cloud offering
- Internal Private Cloud
- AWS Equivalent
- Content Farm
- Scale-Out Storage
- AWS S3 Equivalent
- Enterprise Drop-Box

- Network Functions Virtualization (NFV)



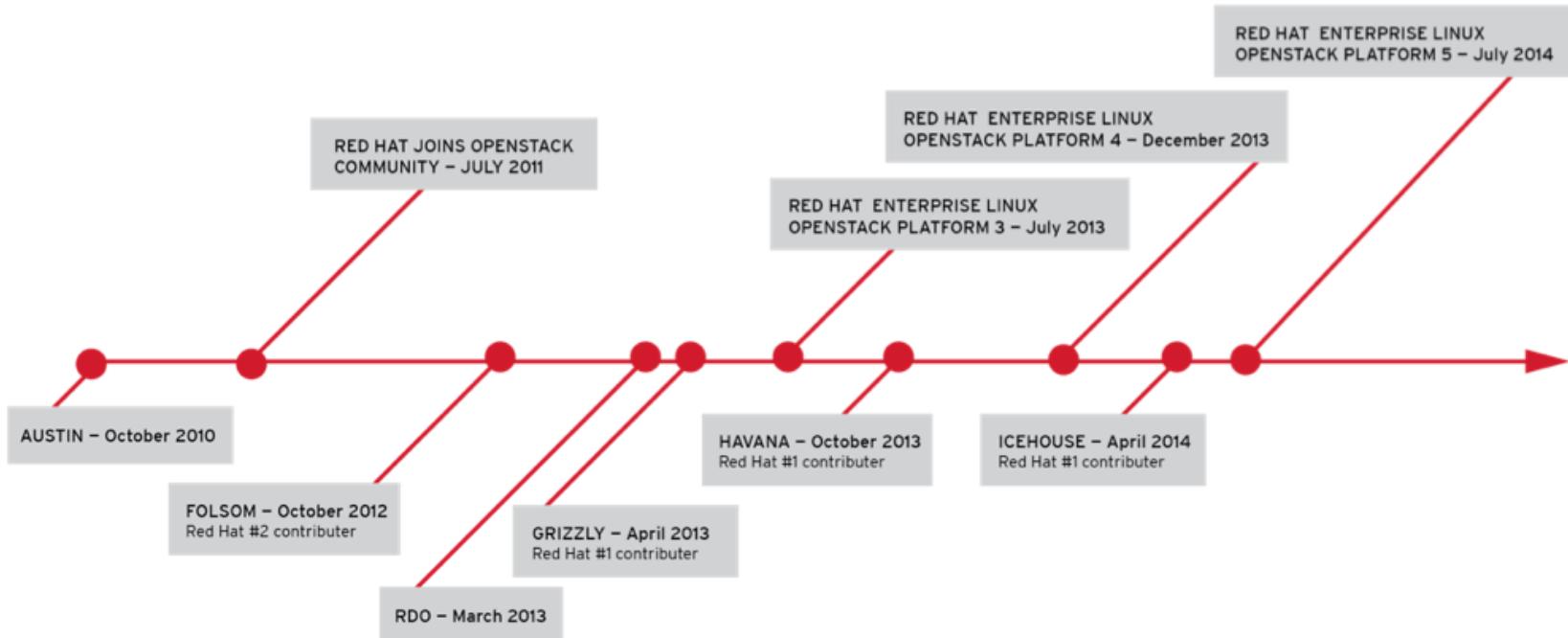
# Red Hat & OpenStack



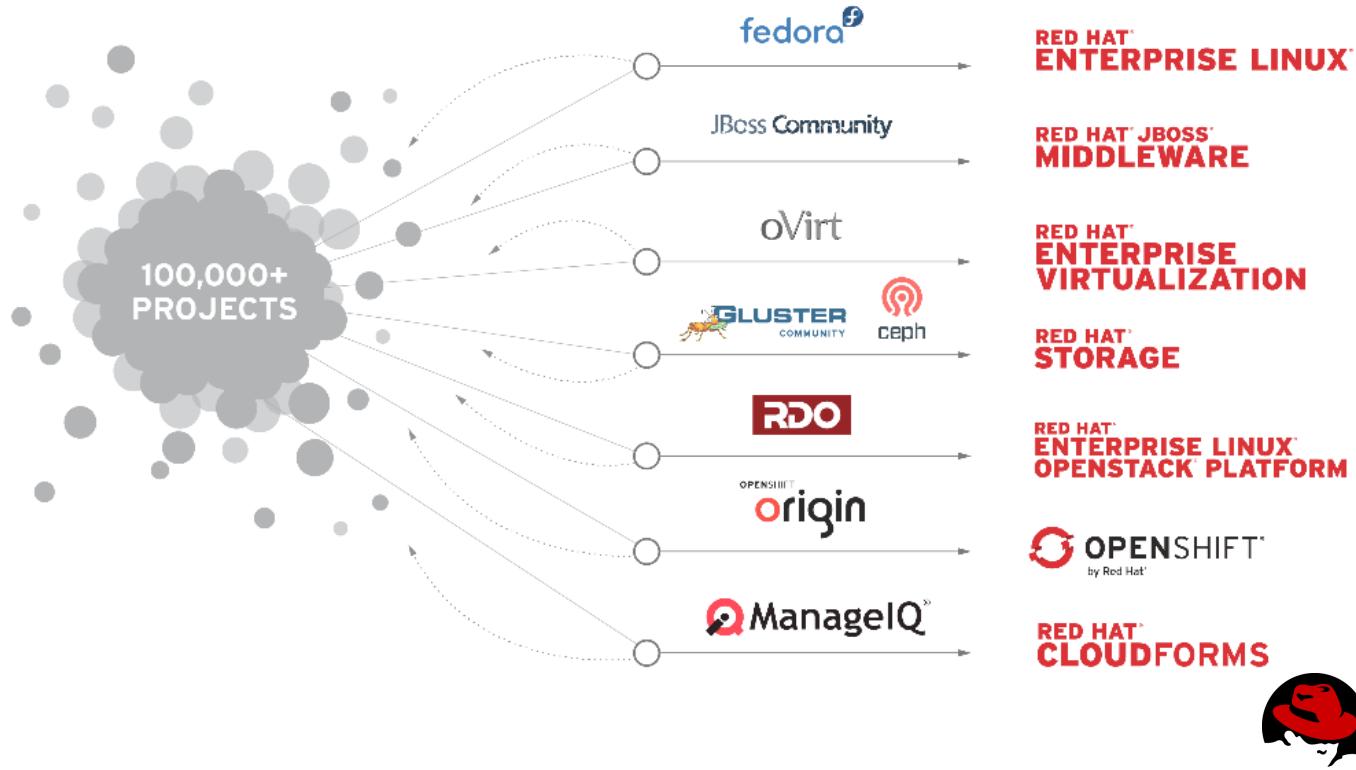
- Major Contributor to OpenStack
- Enterprise Product with 3 years production support
- Global Support & Trainings
- Certifications - inherited from Red Hat Enterprise Linux
- Integration with Cloud Management Platforms
- Ecosystem - Red Hat OpenStack Cloud Infrastructure Partner Network



# Red Hat & OpenStack



# The Road to Enterprise Products



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# Workloads are evolving



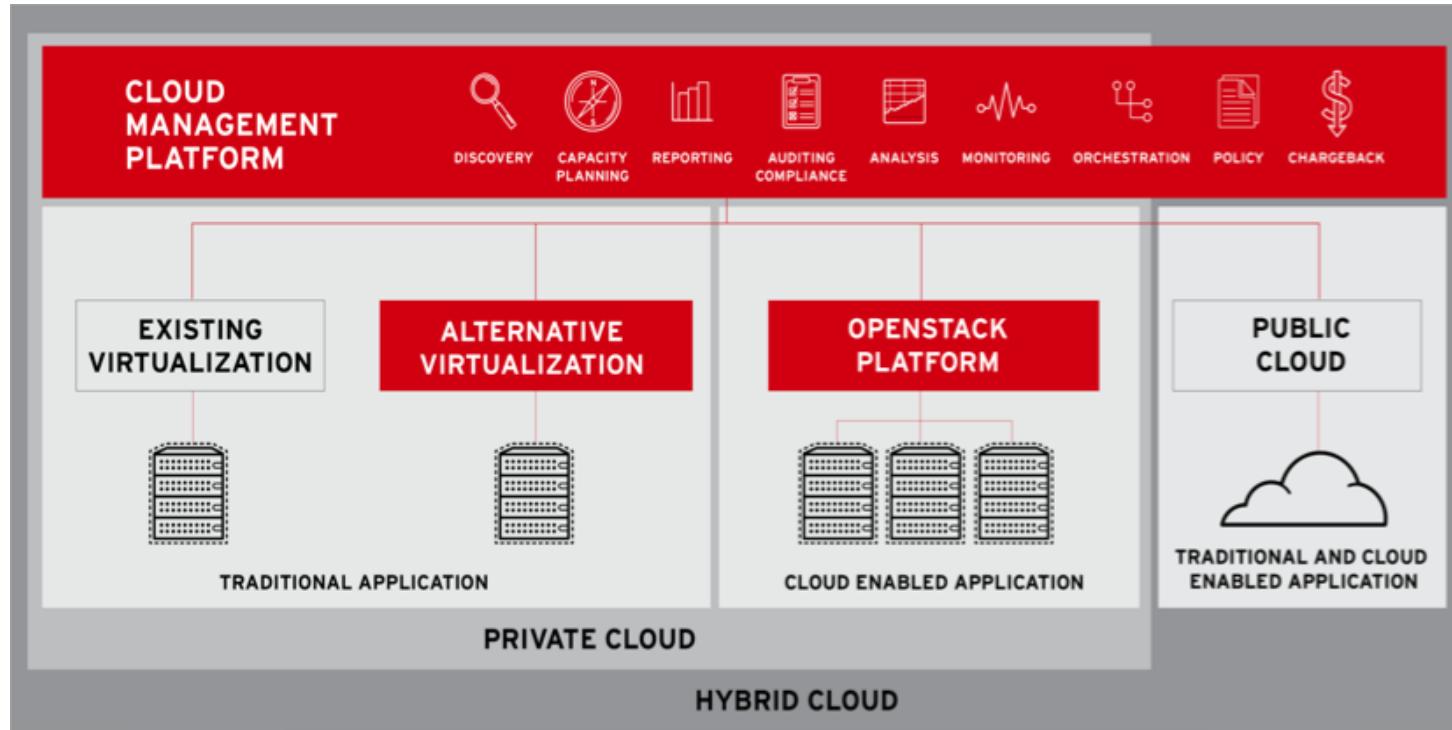
## TRADITIONAL WORKLOADS

- Typically resides on a single large Virtual Machine
- Cannot tolerate any downtime
- Needs expensive high availability tools found in VMware vSphere
- Application scales up rather than out

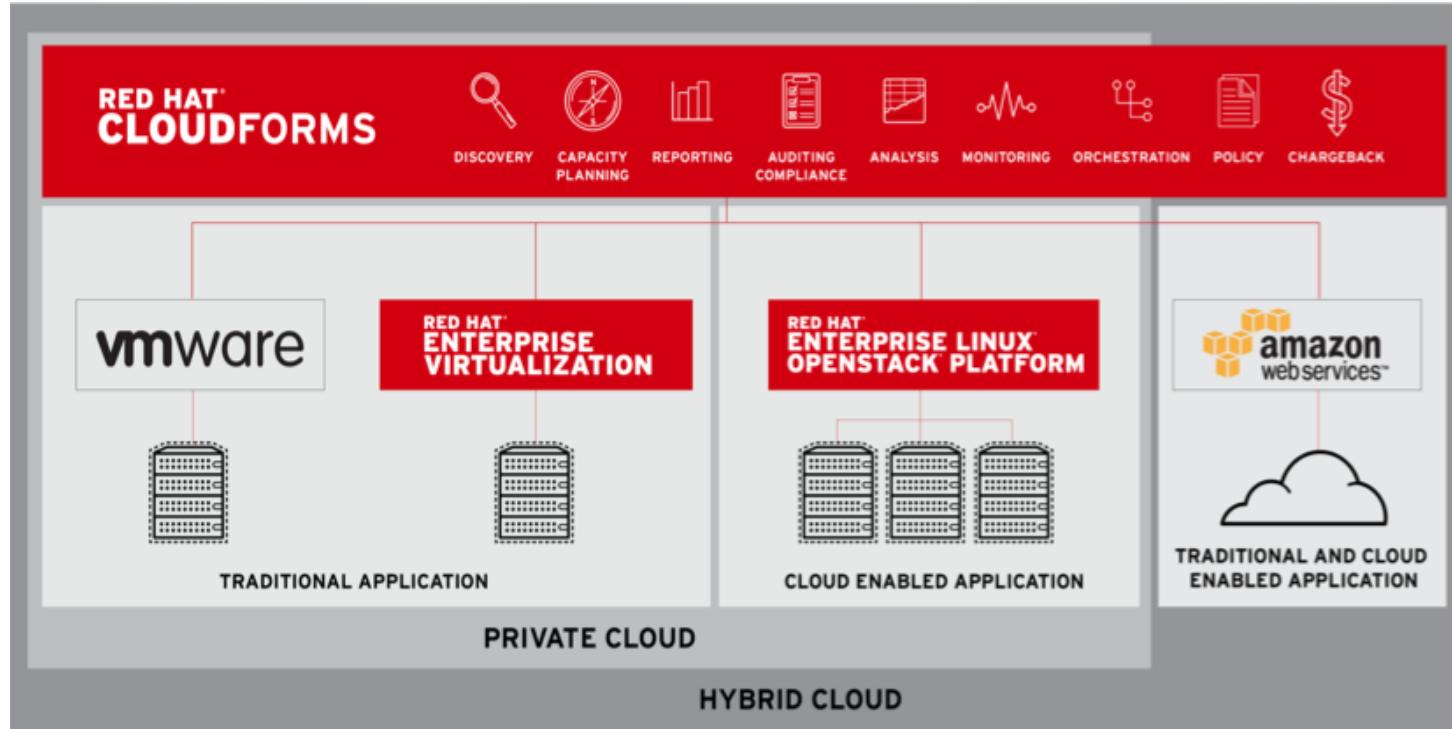
## CLOUD WORKLOADS

- Workload resides on multiple Virtual Machines
- Tolerates VM failure – if one fails, another quickly replaces it
- Fault tolerance often built into workload
- Application scales out rather than up

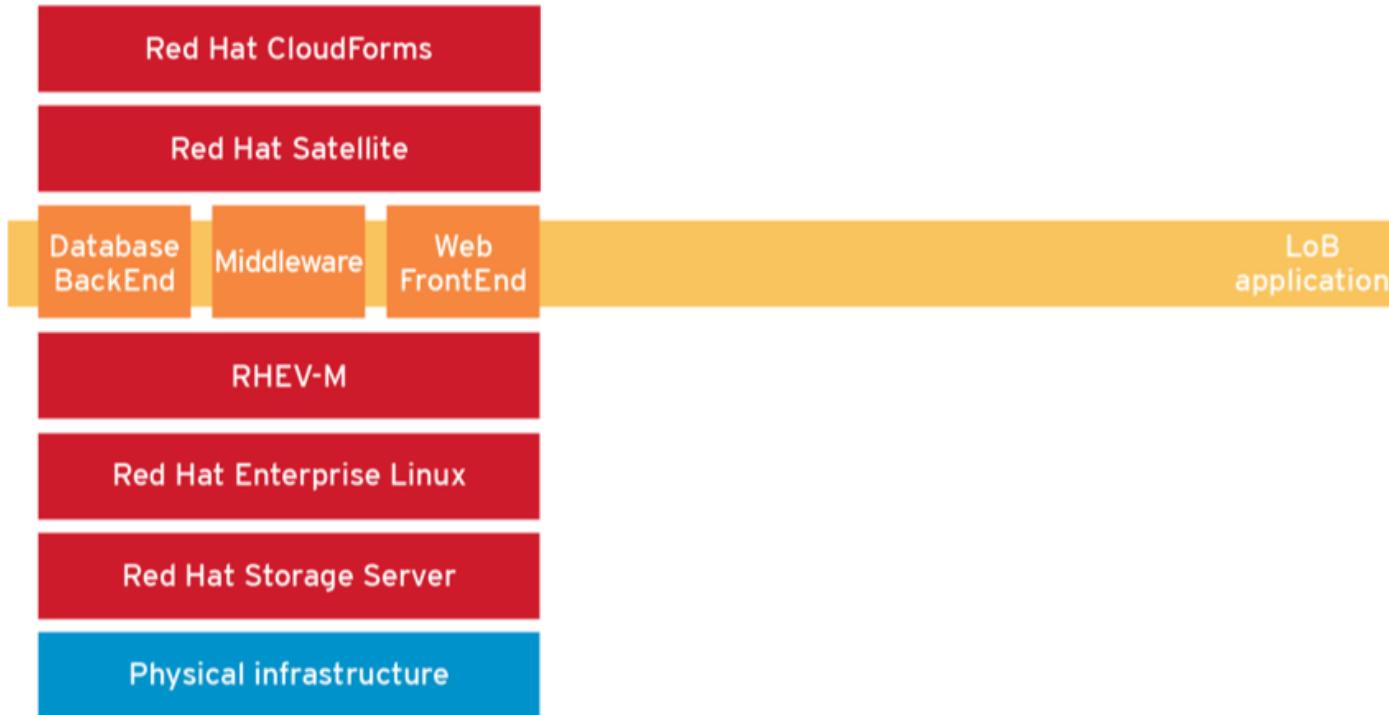
# Hybrid Cloud Management



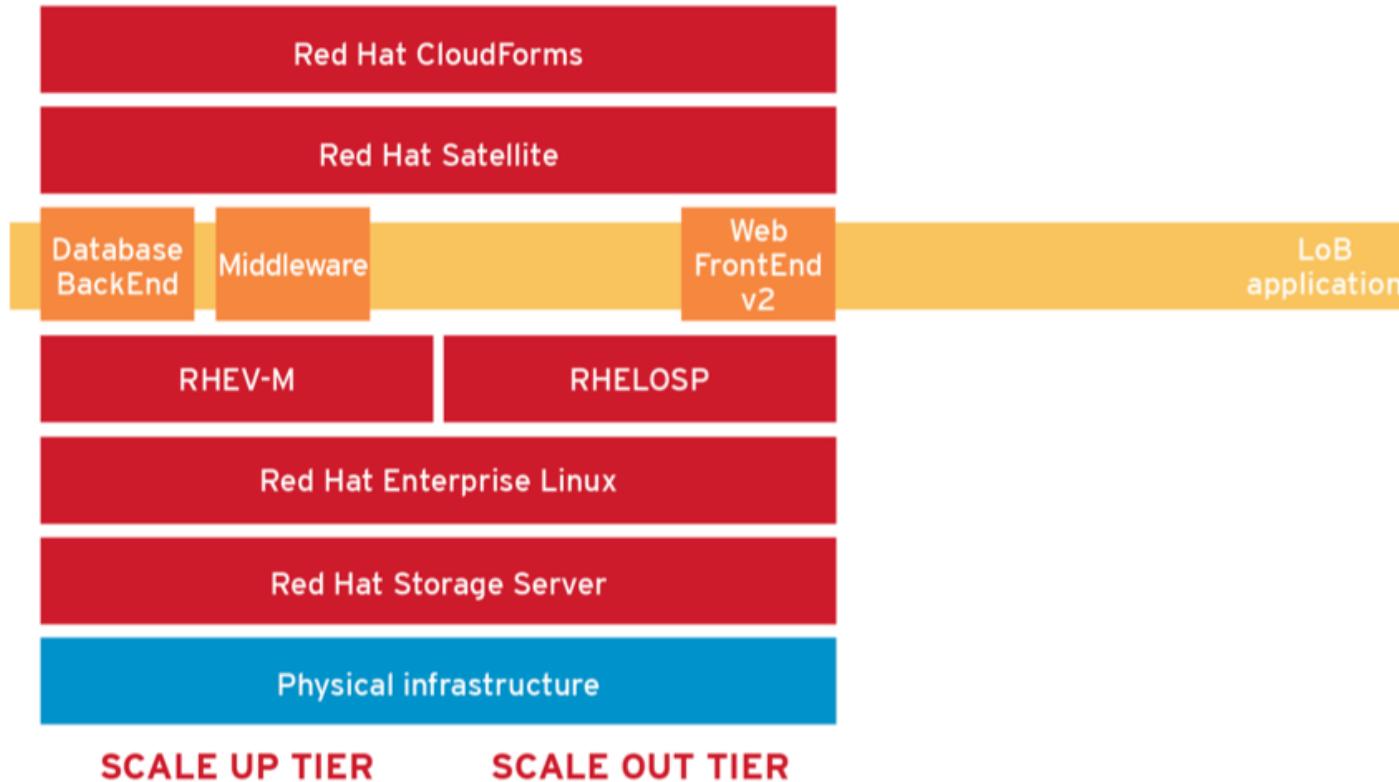
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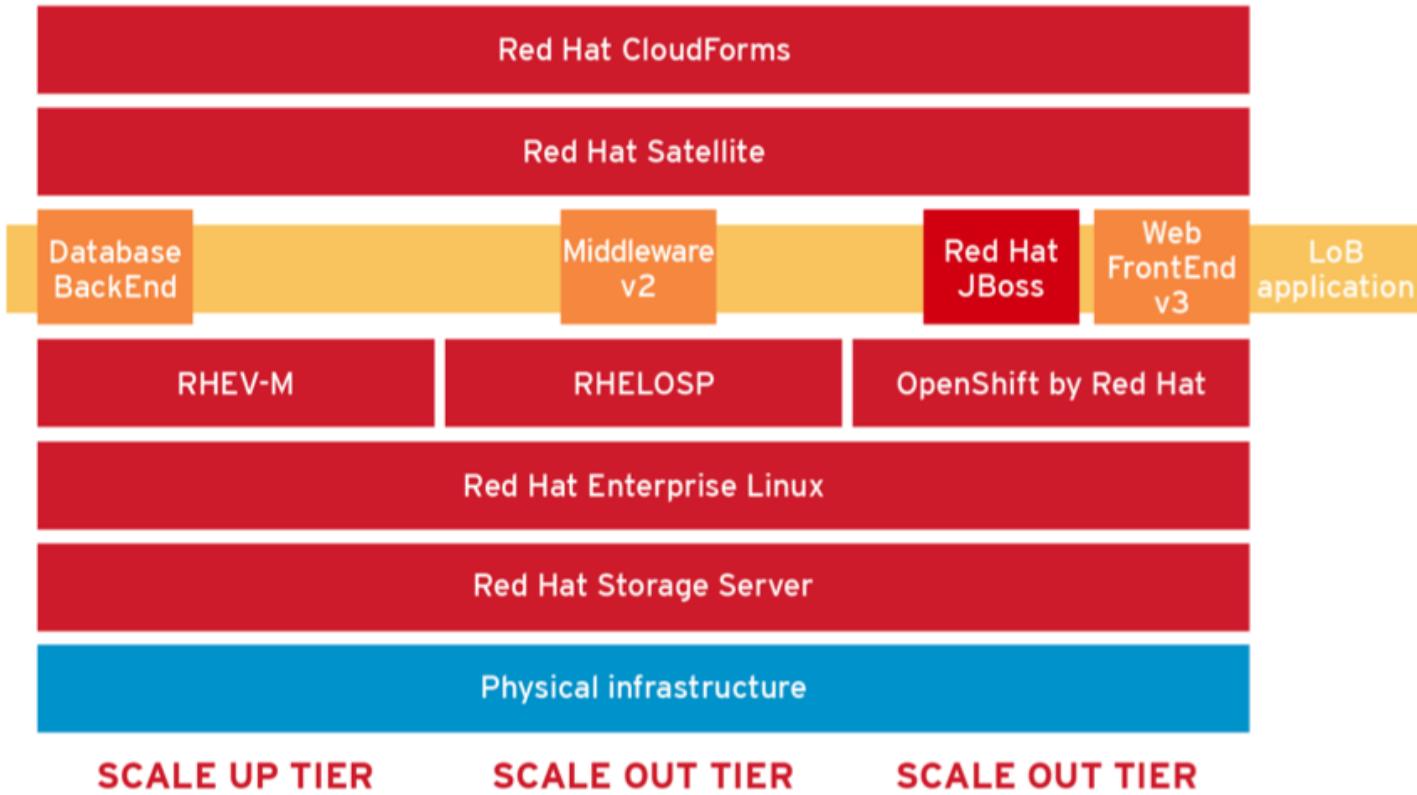
# Migrating Workloads - Journey



# Moving The Web Tier To Scale Out



# Distributing Workloads Across Platforms



# In Summary

- OpenStack revolutionizes infrastructure services in compute, networking and storage
- OpenStack is deeply integrated with Linux
- Red Hat provides an enterprise grade OpenStack product with 3 years of production support
- Workloads are evolving, and there is a way to run each one of them on a suitable platform - while managing them from a single pane of glass

# Thank you.

