



Running RHV integrated with Cisco ACI

JuanLage

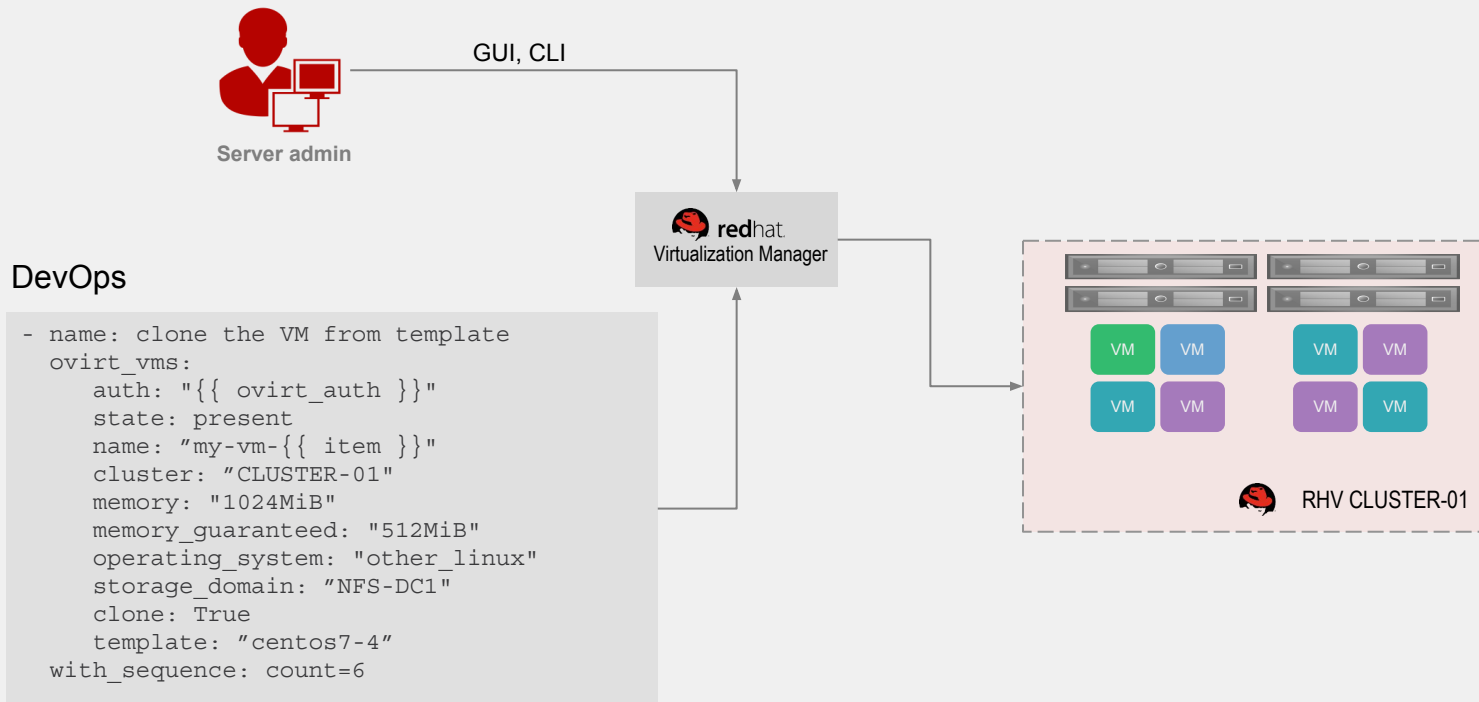
Principal Engineer - Cisco

May 2018

Agenda

- Why we need SDN on the Data Center
 - What problem are we solving?
- Introduction to Cisco Application Centric Infrastructure (ACI)
- ACI and Red Hat Virtualization integration
- ACI and RHV Designs
- Q&A

Creating a Virtual Machine on RHV takes minutes ...



But to make a
Virtual Machine
useful ...

- It needs to connect to a network
- The network needs VLAN, Subnets, routing policies ...
- Security rules must be applied
- etc, ...

Traditionally this means
(manual) box-by-box
configurations by the network
admin, and then on RHVM

Every new network requires many provisioning touch points on the network, and on RHVM

1. Assign VLAN, subnets, routing, and configure them on each and every device and on every required port.

Every new Logical Network requires touching all network elements and knowledge of every port required for clusters.



Fabric Admin

VLAN10
(NFS)

VLAN40
(App-01)

VLAN50
(App-02)



Virtualization Manager

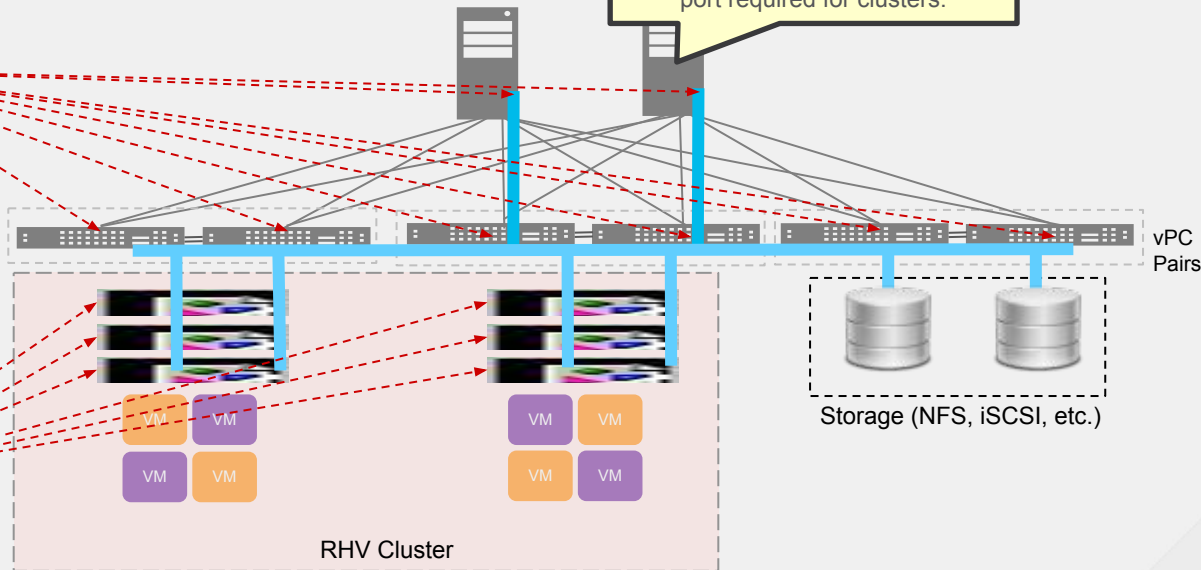


Server Admin

NFS
(vlan20)

APP-01
(vlan40)

APP-02
(vlan50)



2. Configure Logical Networks with given VLANs, and assign them to the NICs on each and every host in the Cluster

Lot's of repetitive tasks that are prone to errors and can be complicated to automate at scale

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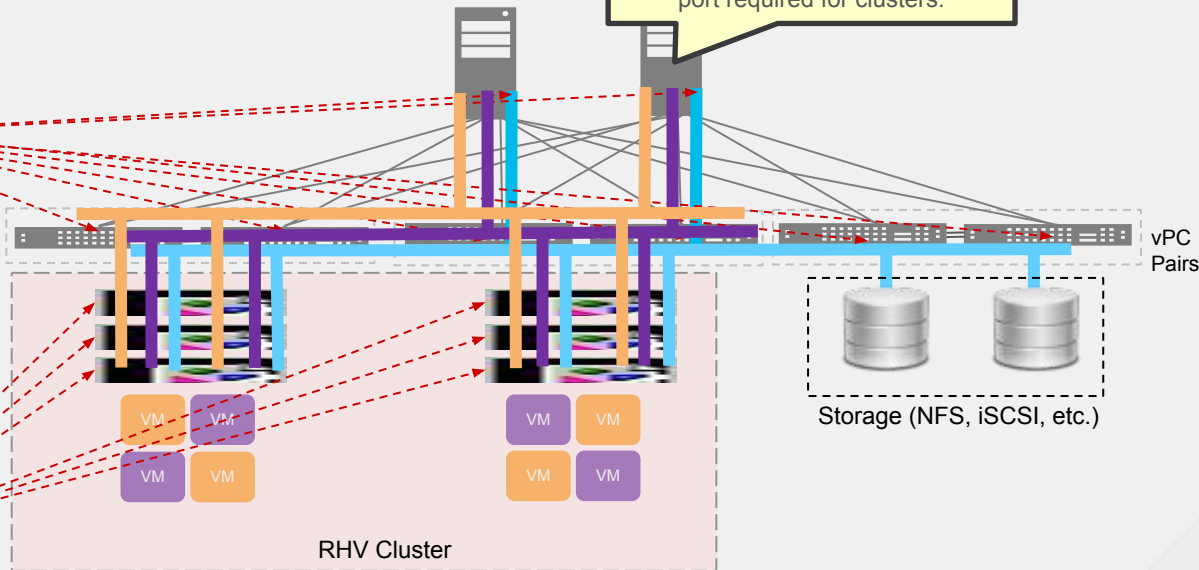
Fabric Admin

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2. Configure Logical Networks with given VLANs, and assign them to the NICs on each and every host in the Cluster

Introducing Cisco ACI

Application Centric Infrastructure

DC Fabric with a Single Point of Management with full FCAPS

Network Virtualization

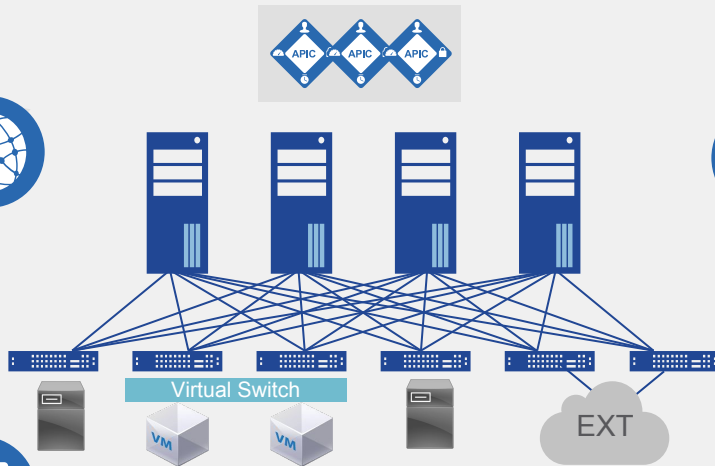


- Distributed L2/L3 across the fabric, across different sites
- Seamless networking for bare metal, storage, VMs and Containers

Virtualization Integration



- Virtualization Managers: VMware vCenter, Microsoft SCVMM, Red Hat Virtualization
- OpenStack
- Kubernetes, OpenShift, Cloud Foundry



Integrated Security

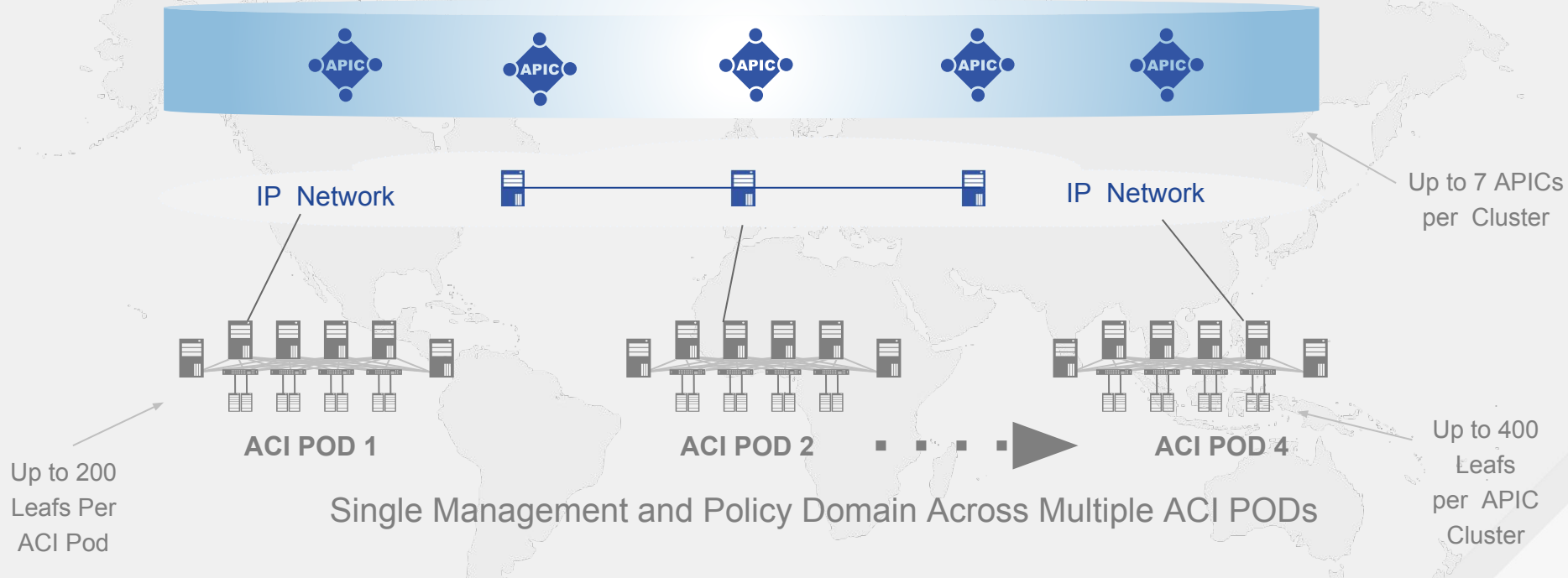
- Distributed Programmable L2-L4 security Policies
- Micro Segmentation
- L4-7 Service Chaining



Ecosystem

- Cisco ACI App Center
- +65 Ecosystem Partners
- Cloud Management Integration

Application Centric Infrastructure – Seamless Services across data centers



Consistent
Policy

Centralized
Management

Isolated Fault
Domain By Pod

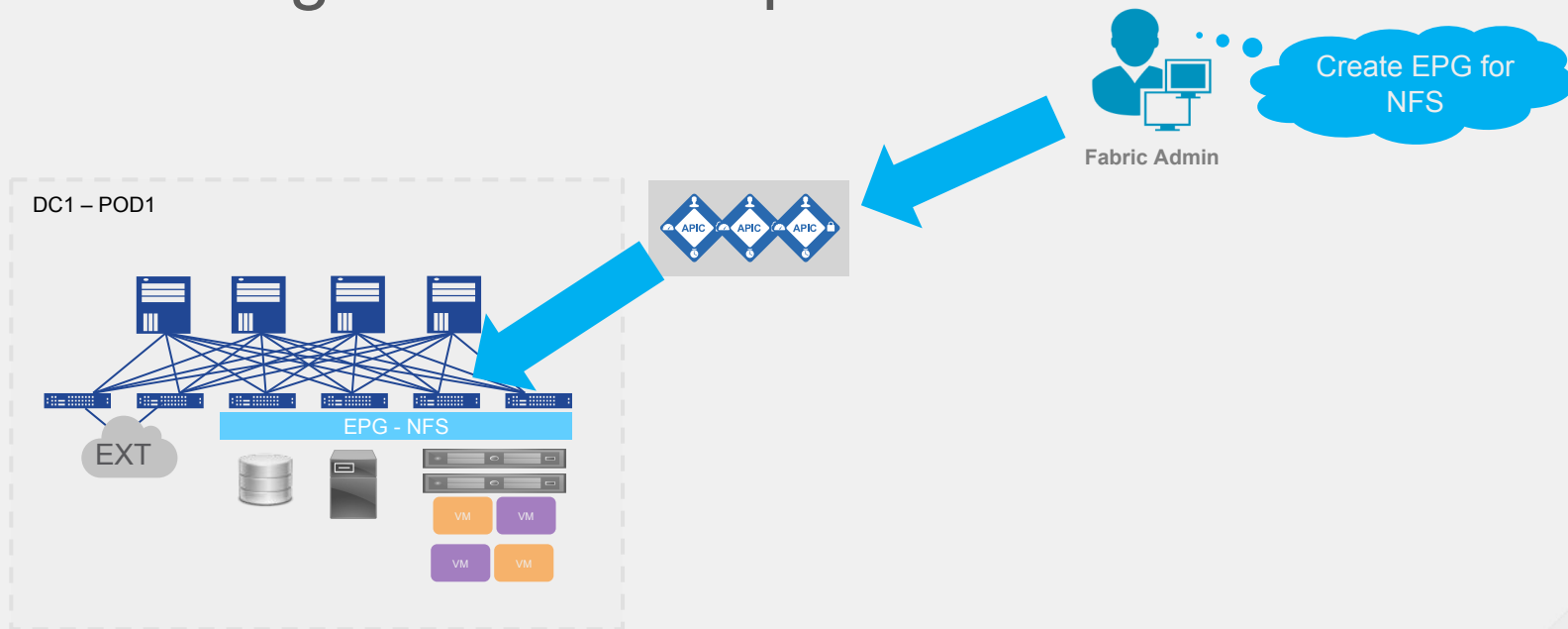
Scalability With
Simplicity

ACI provides network
virtualization and policy for
any type of endpoint

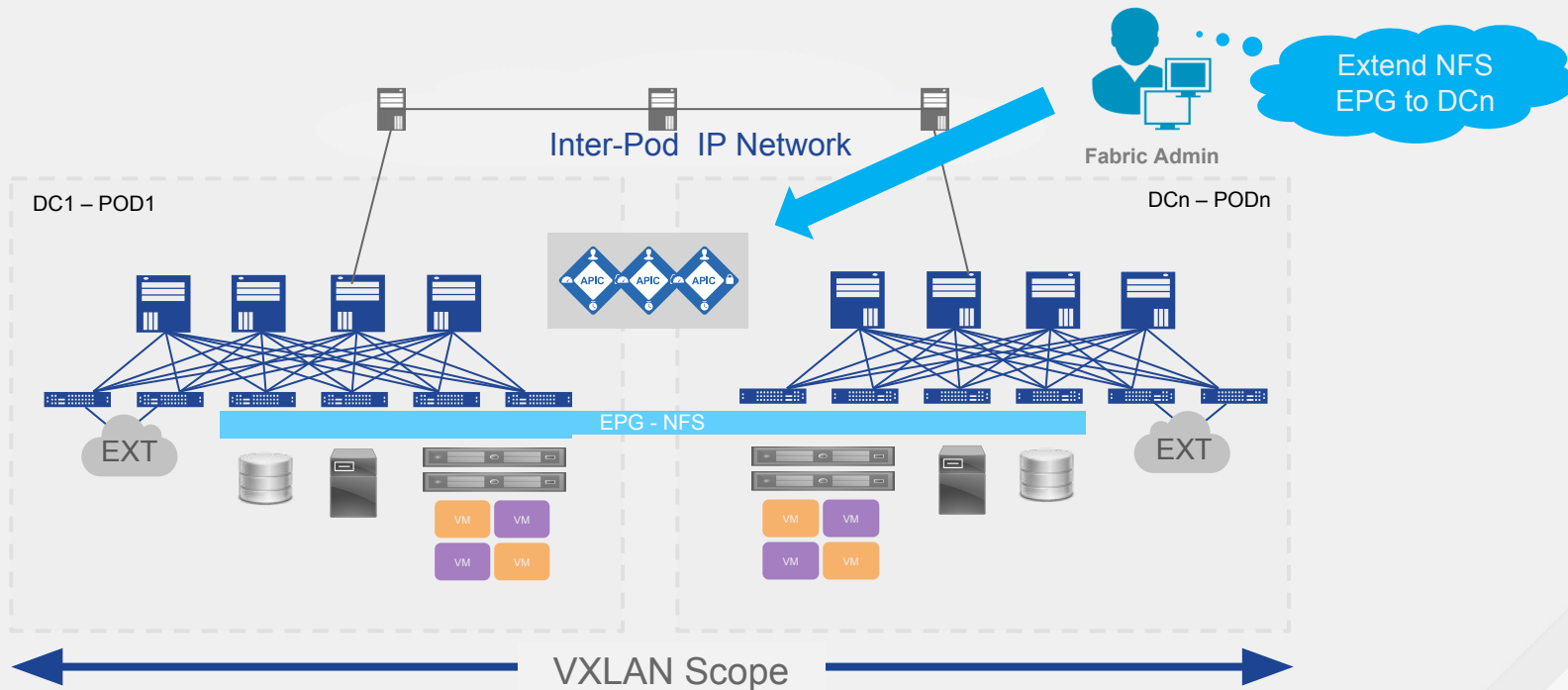
Networks are abstracted as
EndPoint Groups (EPG).

EPGs can group endpoints based on encapsulation, IP, MAC, VM attributes, containers annotations, etc.

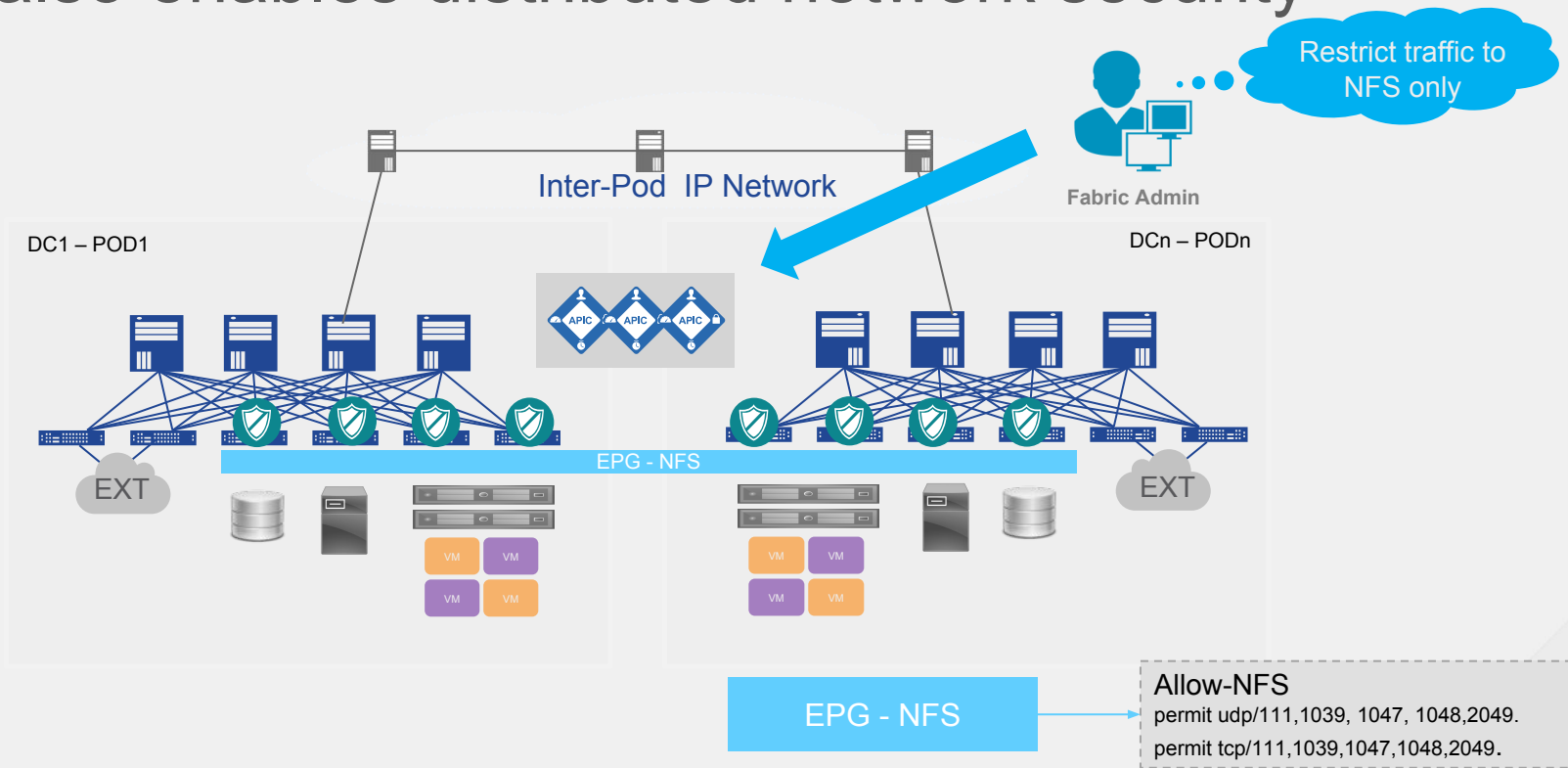
APIC provides a single point of management for all network configuration and operations



ACI provides automatic network extension leveraging its VXLAN integrated overlay



ACI also enables distributed network security



Cisco ACI Industry Leadership

5,000+

ACI Customers

50+%

ACI Attach Rate

65+

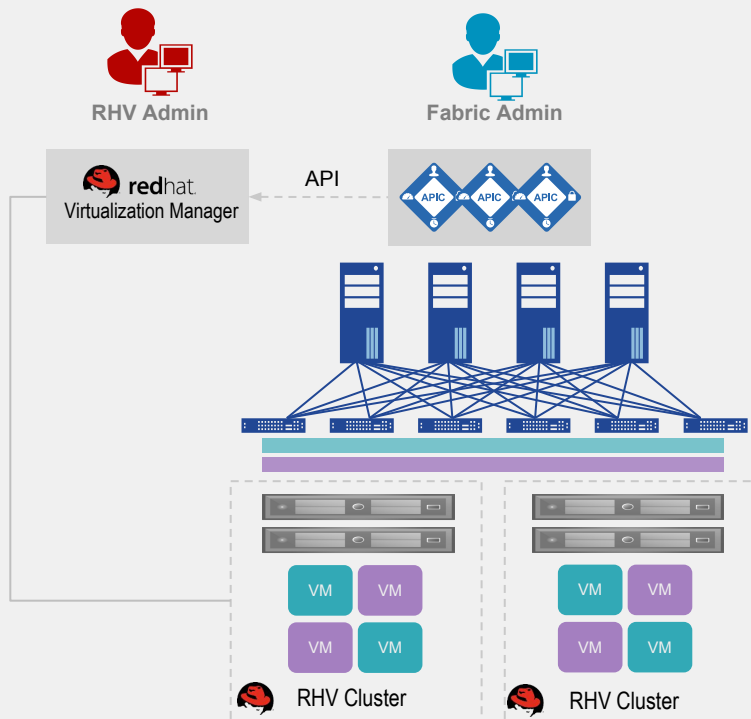
Ecosystem
Partners

Ecosystem Partners



ACI with VMM Domain for Red Hat Virtualization (since ACI 3.1 & RHV 4.1.7)

Cisco ACI and Red Hat Virtualization Integration



Key Benefits



Automate and accelerate provisioning
– APIC to provision Logical Networks



Enhance operations and team collaboration –
APIC visibility into RHV Domains



Enhanced security and segmentation
– ACI to implement distributed network policy



Simplify Migration from proprietary
hypervisors

APIC leverages RHVM Inventory for Virtual/Physical Correlation

RED HAT VIRTUALIZATION

Host: cluster = Default

Hosts

System

Expand All Collapse All

System

Data Centers

Default

Storage

Networks

Templates

Clusters

Default

Hosts

rhvh-01.nillo.net

rhvh-02.nillo.net

Name	Comment	Hostname/IP	Cluster	Data Center	Status	Virtual Machines	Memory	CPU	Network	SPM
rhvh-01.nillo.net		5.0.7.112	Default	Default	Up	2	5%	0%	0%	SPM
rhvh-02.nillo.net		5.0.7.122	Default	Default	Up	0	3%	0%	0%	Normal

APIC

System Tenants Fabric VM Networking L4-L7 Services Admin Operations Apps

Inventory

Hypervisor - rhvh-01.nillo.net

Properties

Name: rhvh-01.nillo.net
Type: Hypervisor Host
Status: Powered On
OPFLEX Status: DISCONNECTED
OPFLEX Version: n/a

Virtual Machines:

Name	Status
app-server-01	Powered On
test-ubuntu-vm	Powered On
web-centos	Powered On
web-server-01	Powered On

Identify all hypervisors under RHVM administration.

Inventory and status of VM per hypervisor

APIC automatically creates Logical Networks



Fabric Admin

1. Create EPGs on APIC: Web, App, and DB

2. Map EPGs to RHV VMM Domain (and other domains too if required)

APIC automatically configures the Web, App and DB Logical Networks with a dynamically assigned VLANs

Name	Comment	Data Center	Description	Role	VLAN tag	QoS Name	Label
T1_AP1_App		Default		un	2035	-	aci_VMM-RHV-01
T1_AP1_DB		Default		un	2068	-	aci_VMM-RHV-01
T1_AP1_Web		Default		un	2000	-	aci_VMM-RHV-01
NFS-DC2		Default	Network for NFS in DC2	un	2110	-	-
ovirtmgmt		Default	Management Network	un	-	-	-

ACI RHV VMM Domain – Workflow with APIC 3.1

- An ACI VMM Domain associates with one RHV Data Center object
Multiple Data Centers are possible using different VMM Domains
- An ACI EPG maps to a RHVM Logical Network
The integration is supported with RHV networking using Linux bridge or Open vSwitch (OVS)
- When an EPG is associated with a RHV VMM Domain, APIC creates a corresponding Logical Network and **associates it with all clusters** in the RHVM Data Center

ACI performs distributed
switching, routing and
security between Logical
Networks

Better network operations: the fabric admin can find RHV objects easily

RED HAT VIRTUALIZATION

Vms: cluster = Default

Virtual Machines

System

Expand All Collapse All

System

Data Centers

Default

Storage

Networks

Name	Comment	Host	IP Address	FQDN	Cluster	Data Center	Memory
centos-server		rhvh-01.nillo.net	10.10.10.10	centos-server.nillo.net	Default	Default	11
test-ubuntu-vm		rhvh-02.nillo.net	10.10.10.25	test-server.nillo.net	Default	Default	15

Search: VM Networking --> VM

test-ubuntu-vm

test-server-02-ACI

test-server-01-ACI

test-demo-vm

test-server-03-ACI

test-server-01

test-server-02

test-server-03

test-server-01

test-server-02

test-server-03

See Also

Access Policies

APIC

System Tenants Fabric VM Networking L4-L7 Services Admin Operations Apps

Inventory

Virtual Machine - test-ubuntu-vm

Quick Start

CloudFoundry

Kubernetes

Microsoft

OpenStack

Redhat

VMM-RHV-01

Controllers

rhvm-01

Hypervisors

rhvh-01.nillo.net

rhvh-02.nillo.net

Virtual Machines

test-ubuntu-vm

Properties

Name: test-ubuntu-vm

Status: Powered On

Virtual Interfaces	Name	IP	MAC	State	Network
nic1	---	00:1A:4A:16:01:51	Up	T1_API_Web	

Custom Attributes

Name	Value
------	-------

Select Actions to create a new item.

Look for a hypervisor, or for a VM by its name, find where they are connected, etc.

Verify VM IP, MAC, status and find EPG where it is connected

ACI M-POD and RHV Cluster Design Options

The fabric implements distributed routing, switching and security within and across DCs

No bottlenecks. 10/25GE line rate communication for all paths:

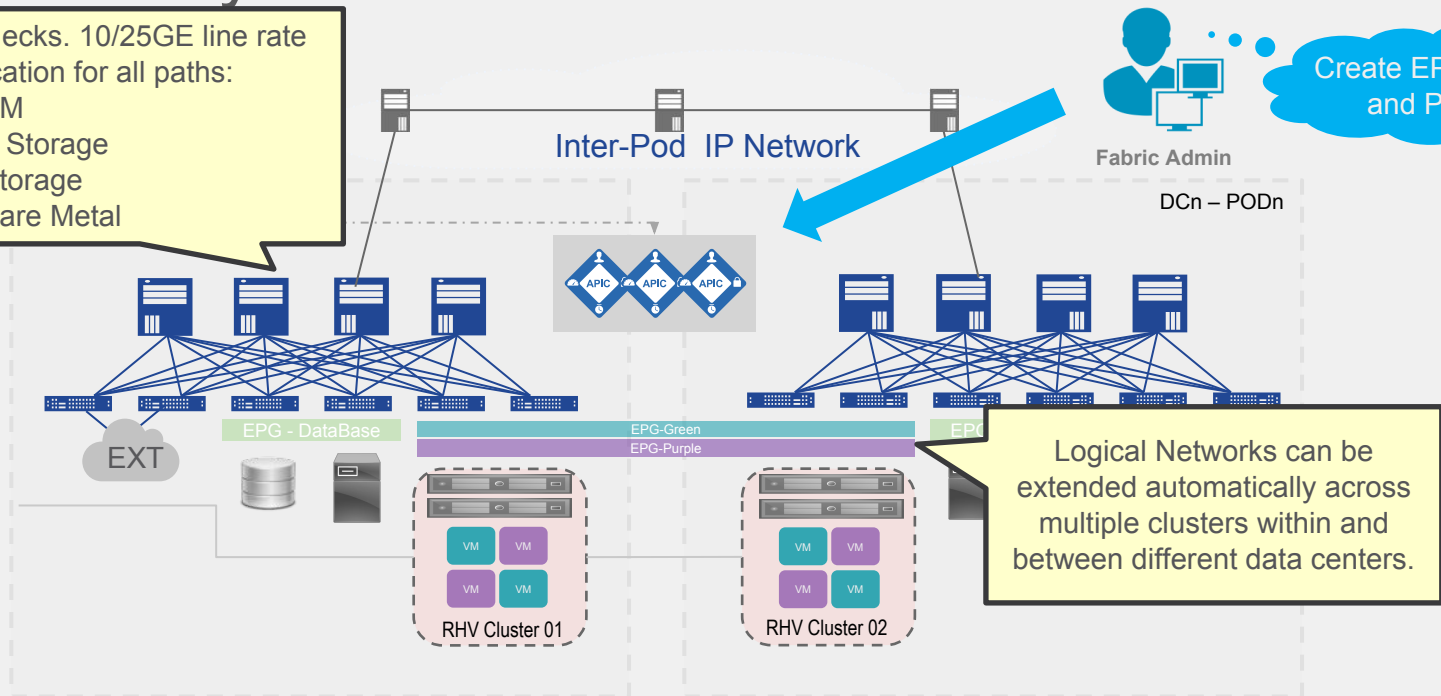
- VM to VM
- Node to Storage
- VM to Storage
- VM to Bare Metal

Inter-Pod IP Network

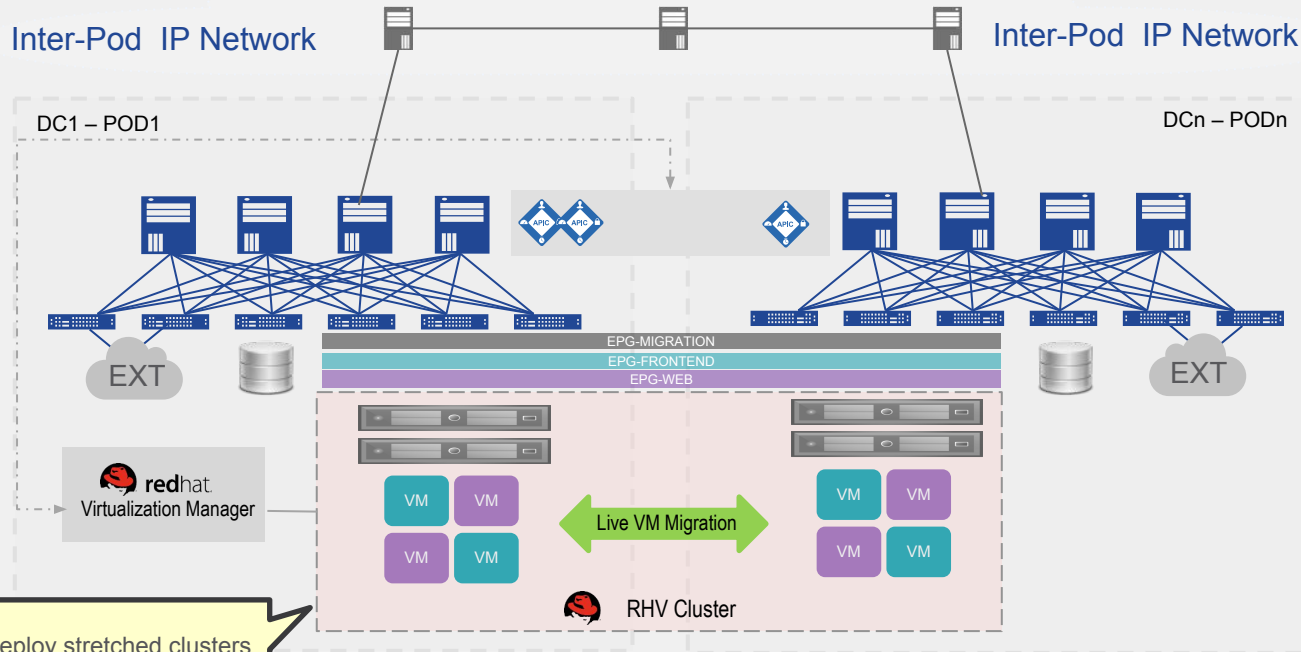
Create EPG Green and Purple

Fabric Admin

DCn – PODn



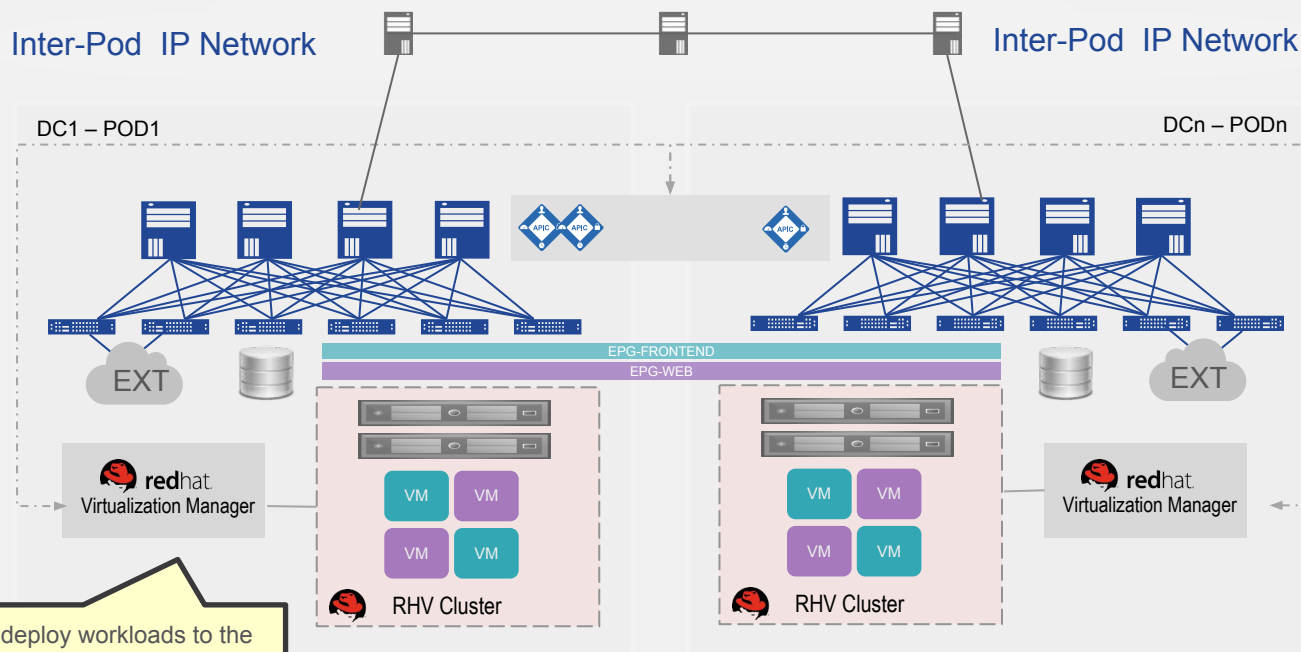
ACI Multi-POD facilitates running stretched RHV Clusters



Customers can deploy stretched clusters
(assuming storage solution support)

RHV and ACI Multi-POD

– Independent RHV Managers



Customers can deploy workloads to the same networks on both RHV Managers. This scenario probably lends itself better to Multi-Site to match network and virtualization availability domains.

ACI native Ansible support

There are 50+ Ansible modules for ACI

http://docs.ansible.com/ansible/latest/scenario_guides/guide_aci.html

The screenshot shows the Ansible documentation website. The top navigation bar includes links for Documentation, ANSIBLEFEST, PRODUCTS, COMMUNITY, WEBINARS & TRAINING, and BLOG. The left sidebar is titled 'Ansible 2.5' and contains a search bar and a list of categories: INSTALLATION, UPGRADE & CONFIGURATION; USING ANSIBLE; CONTRIBUTING TO ANSIBLE; EXTENDING ANSIBLE; and SCENARIO GUIDES. Under SCENARIO GUIDES, the 'Cisco ACI Guide' is selected. The main content area displays the 'Cisco ACI Guide' page, which includes a breadcrumb trail 'Docs » Cisco ACI Guide', an 'Edit on GitHub' link, and sections for 'What is Cisco ACI?', 'Application Centric Infrastructure (ACI)', 'Application Policy Infrastructure Controller (APIC)', and 'ACI Fabric'.

Documentation ANSIBLEFEST PRODUCTS COMMUNITY WEBINARS & TRAINING BLOG

Ansible 2.5

For previous versions, see the documentation archive.

Search docs

INSTALLATION, UPGRADE & CONFIGURATION

- Installation Guide
- Configuring Ansible
- Ansible Porting Guides

USING ANSIBLE

- User Guide

CONTRIBUTING TO ANSIBLE

- Ansible Community Guide

EXTENDING ANSIBLE

- Developer Guide

SCENARIO GUIDES

- Cisco ACI Guide
- What is Cisco ACI ?
- Using the ACI modules
- ACI authentication

Docs » Cisco ACI Guide [Edit on GitHub](#)

Cisco ACI Guide

What is Cisco ACI ?

Application Centric Infrastructure (ACI)

The Cisco Application Centric Infrastructure (ACI) allows application requirements to define the network. This architecture simplifies, optimizes, and accelerates the entire application deployment life cycle.

Application Policy Infrastructure Controller (APIC)

The APIC manages the scalable ACI multi-tenant fabric. The APIC provides a unified point of automation and management, policy programming, application deployment, and health monitoring for the fabric. The APIC, which is implemented as a replicated synchronized clustered controller, optimizes performance, supports any application anywhere, and provides unified operation of the physical and virtual infrastructure.

The APIC enables network administrators to easily define the optimal network for applications. Data center operators can clearly see how applications consume network resources, easily isolate and troubleshoot application and infrastructure problems, and monitor and profile resource usage patterns.

The Cisco Application Policy Infrastructure Controller (APIC) API enables applications to directly connect with a secure, shared, high-performance resource pool that includes network, compute, and storage capabilities.

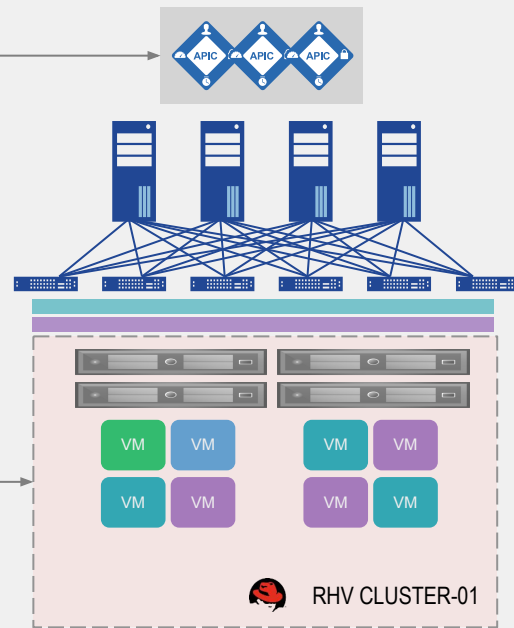
ACI Fabric

Creating a network now takes less time than creating a Virtual Machine ...

```
- name: map EPG to RHV VMM
  Aci_epg_to_domain:
    hostname: apic-01
    private_key: /usr/me/admin.key
    tenant: "RHSummit"
    ap: "MyApp"
    epg: "{{ item }}"
    domain_type: vmm
    vm_provider: redhat
    domain: RHV-VMM-01
  with_items:
    - Green
    - Purple
```

```
- name: clone the VM from template
  ovirt_vms:
    auth: "{{ ovirt_auth }}"
    state: present
    name: "my-vm-{{ item }}"
    cluster: "CLUSTER-01"
    memory: "1024MiB"
    memory_guaranteed: "512MiB"
    operating_system: "other_linux"
    storage_domain: "NFS-DC1"
    clone: True
    template: "centos7-4"
  with_sequence: count=6
```

 **redhat.**
Virtualization Manager



ACI and RHV VMM Domain Summary

Why ACI and Red Hat Virtualization

- Automate and accelerate provisioning – APIC automatically provisions Logical Networks and physical fabric.
- Line rate at 10/25GE for all server communications
- Extend networks to any cluster, any Data Center
- Implement Programmable, Distributed Network Security
- APIC visibility into RHV Domains to facilitate operations and team collaboration

Review online demos

ACI with RHV Intro - <https://youtu.be/HpFAyPgmaql>

ACI with RHV and Ansible - <https://youtu.be/W1oVzv8iRsk>

Simplify migrating from vCenter to RHV - <https://youtu.be/3qsi1G3hjMM>

Where to find more information

- ACI and Red Hat Virtualization White Paper:

<https://www.cisco.com/c/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/white-paper-c11-740535.html>

- ACI Loves KVM and Red Hat Virtualization (Cisco Blog):

<https://blogs.cisco.com/datacenter/aci-loves-kvm-and-red-hat-virtualization>

- Cisco ACI and Red Hat Virtualization Configuration Guide:

https://www.cisco.com/c/en/us/td/docs/switches/datacenter/aci/apic/sw/kb/b_Cisco_ACI_Red_Hat_Virtualization.html



Session Abstract

Cisco ACI is a comprehensive SDN solution that provides integrated VXLAN overlays delivering network virtualization and distributed security policies for virtual and physical workloads. Cisco ACI integrates with many Red Hat technologies, including Red Hat Virtualization (RHV), OpenShift, and OpenStack. Red Hat Virtualization allows customers to virtualize mission-critical workloads while building a future foundation for cloud-native and container-based workloads. In this session, attendees will learn the benefits of deploying RHV with Cisco ACI , including:

- Scalable network virtualization
- Distributed security policies
- Micro-segmentation
- Automating Cisco ACI with RHV using Ansible

Join Dominik Holler of Red Hat and Juan Lage of Cisco as they present the current and future integration of Cisco ACI with Red Hat Virtualization and how it benefits customers.