

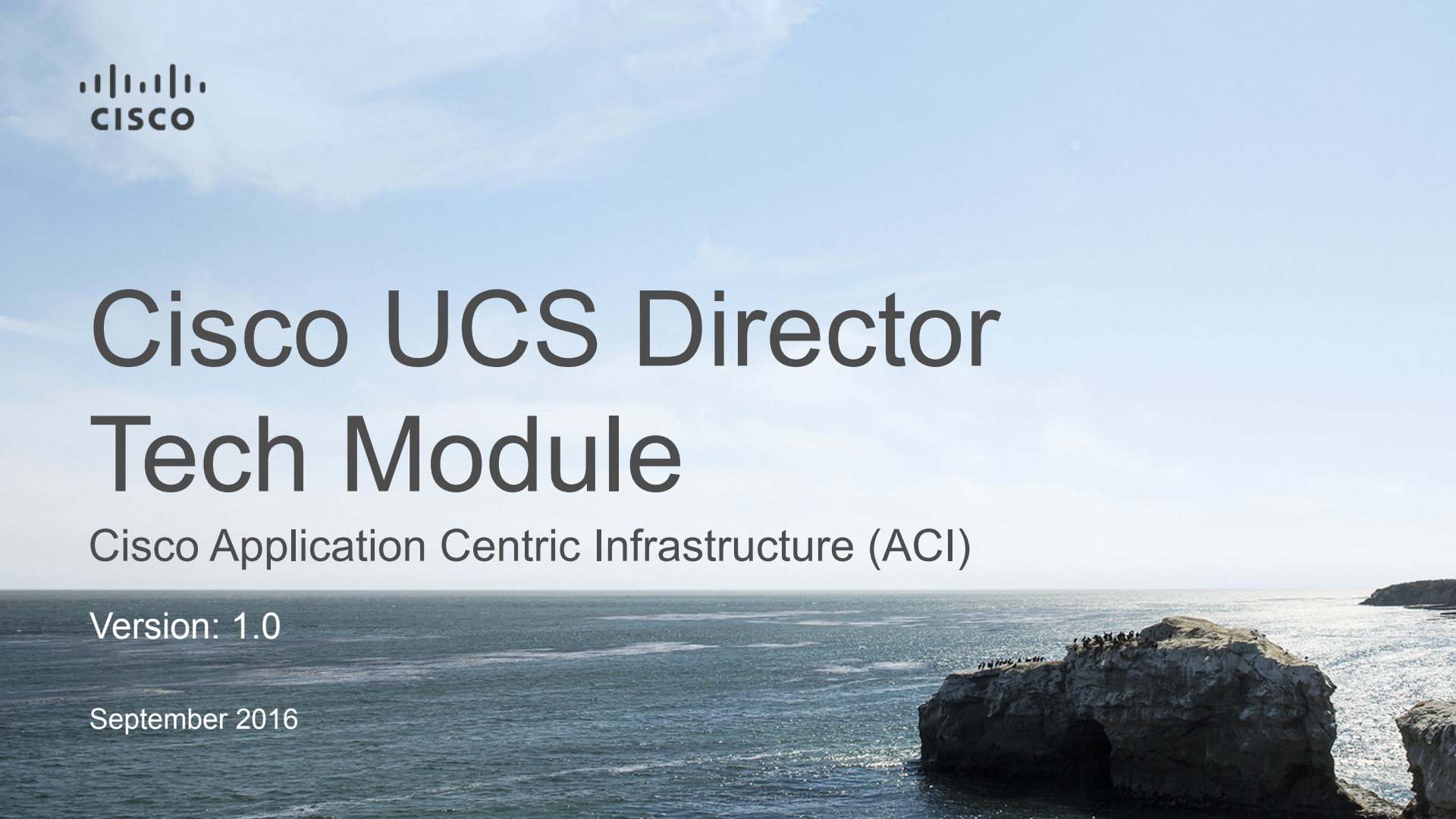


# Cisco UCS Director Tech Module

Cisco Application Centric Infrastructure (ACI)

Version: 1.0

September 2016



# Agenda

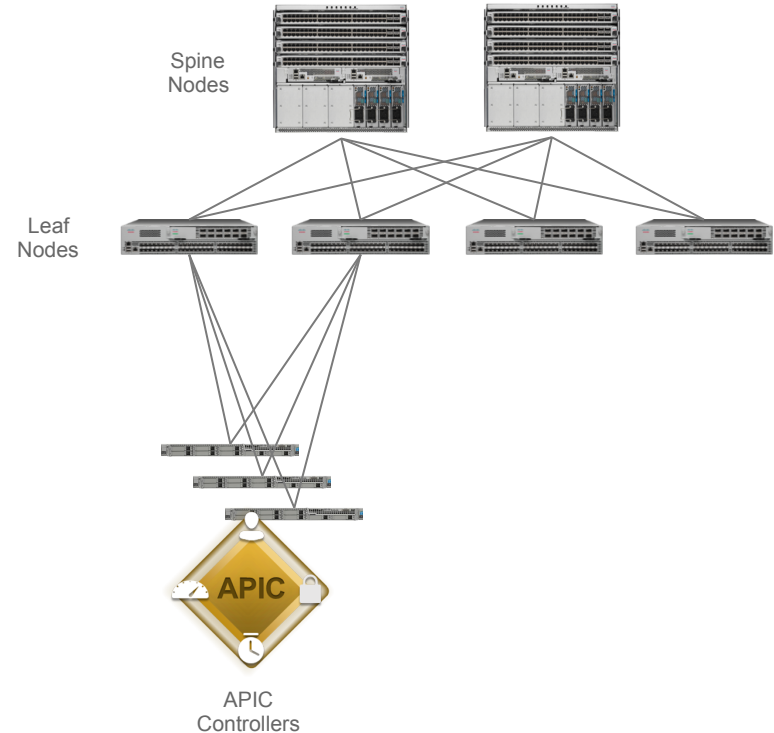
- Overview & Architecture
- Hardware & Software Compatibility
- Licensing
- Orchestration Capabilities
- Reports
- Example Use-Cases



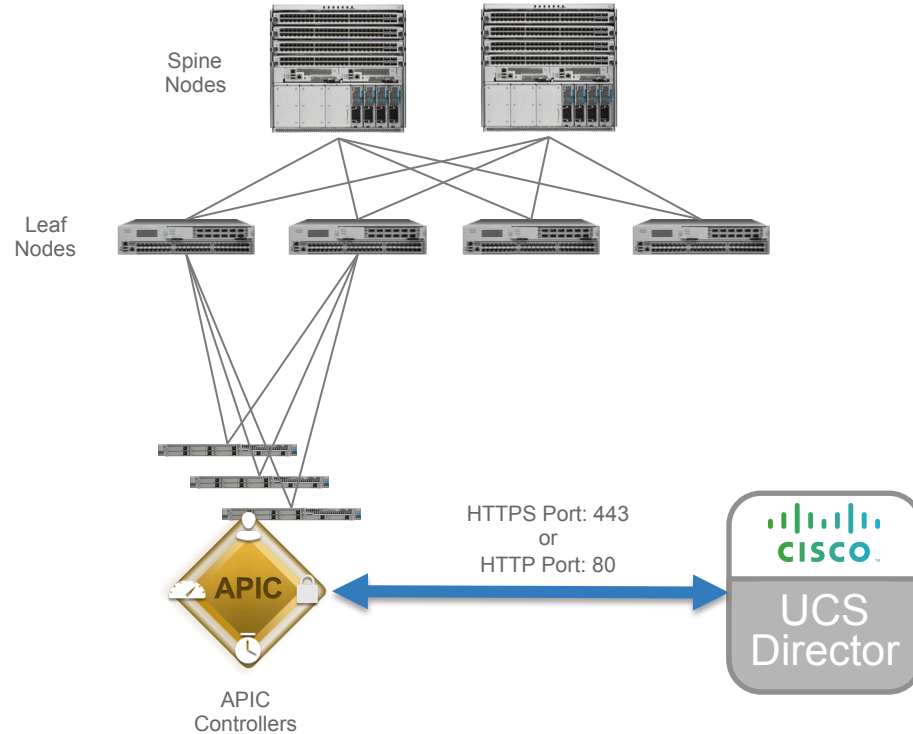
# Architecture & Overview

# ACI Fabric Architecture

- ACI is a network fabric for datacenters
  - Leaf/Spine topology
- Uses VXLAN and Tunnel Endpoints as an underlay
- All configuration is done from a controller (APIC) and pushed to the fabric nodes
- Control plane and data plane are separated
- APICs are deployed in a cluster for redundancy

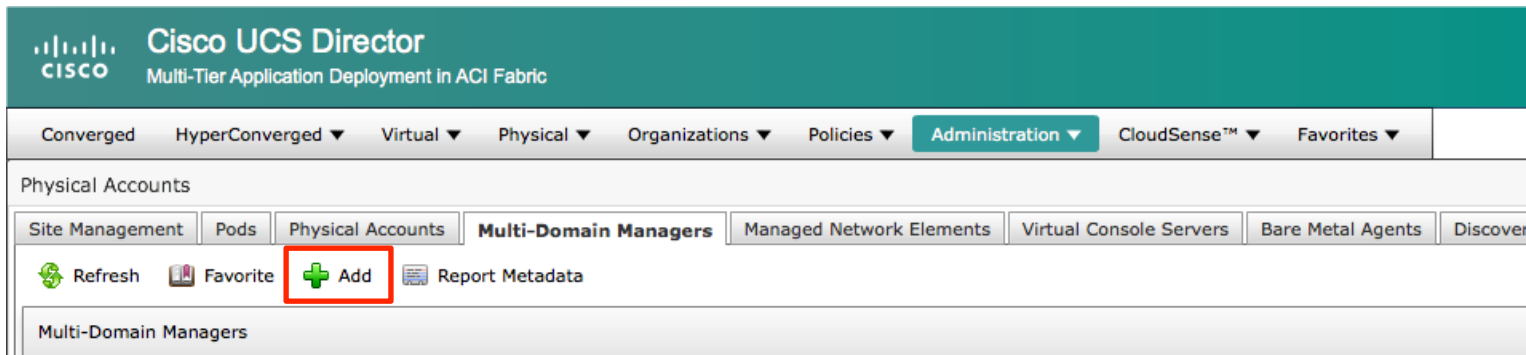


# UCS Director and APIC Integration



# Adding an APIC Account

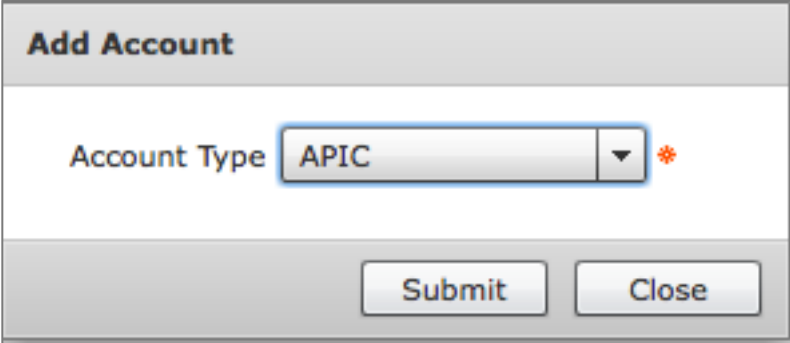
- Navigate to **Administration** → **Physical Accounts**, choose the **Multi-Domain Managers** tab and click **Add**



The screenshot displays the Cisco UCS Director web interface. At the top, the header includes the Cisco logo and the text "Cisco UCS Director Multi-Tier Application Deployment in ACI Fabric". Below the header is a navigation bar with tabs for "Converged", "HyperConverged", "Virtual", "Physical", "Organizations", "Policies", "Administration", "CloudSense™", and "Favorites". The "Administration" tab is selected. Underneath, the "Physical Accounts" section is visible, with sub-tabs for "Site Management", "Pods", "Physical Accounts", "Multi-Domain Managers", "Managed Network Elements", "Virtual Console Servers", "Bare Metal Agents", and "Discover". The "Multi-Domain Managers" sub-tab is active. In this sub-tab, there are four buttons: "Refresh", "Favorite", "Add", and "Report Metadata". The "Add" button, which features a green plus sign icon, is highlighted with a red rectangular box.

# Adding an APIC Account

- Set **Account Type** to **APIC**



The image shows a dialog box titled "Add Account". Inside the dialog, there is a label "Account Type" followed by a dropdown menu. The dropdown menu is currently set to "APIC" and has a small red asterisk icon to its right, indicating a required field. Below the dropdown menu, there are two buttons: "Submit" and "Close".



# Adding an APIC Account

- Enter the information about the APIC to add the account

**Add Account**

Account Type APIC

Account Name

Description

Pod

Server IP

Use Credential Policy

Username

Password

Protocol

Port

Contact

Location

**NOTE:** Only enter the information for one APIC controller in the APIC controller cluster, the rest of the APIC controllers in the cluster will be automatically discovered and associated with this account

Converged HyperConverged Virtual Physical Organizations Policies Administration CloudSense™ Favorites

Physical Accounts

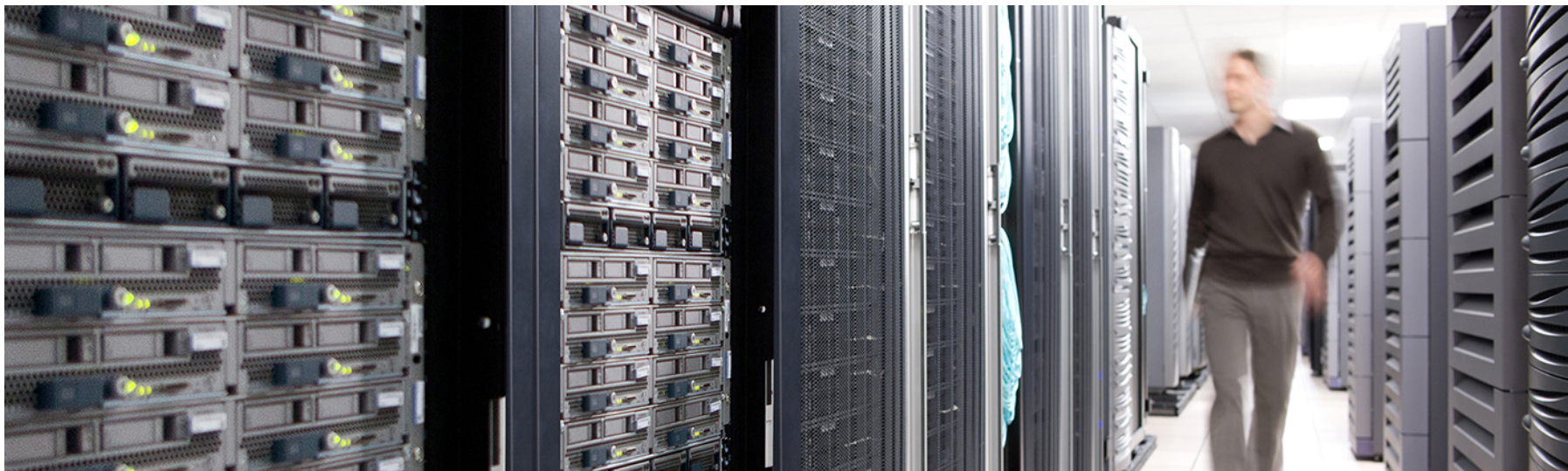
Site Management Pods Physical Accounts Multi-Domain Managers Managed Network Elements Virtual Console Servers Bare Metal Agents Discovered Dev

Refresh Favorite Add Edit Delete View Test Connection Manage Tag Add Tags Delete Tags Report Metadata

Multi-Domain Managers

ID	Account Name	Connection St	Contact	Location	Server	Description
1	ACI-APIC	Success			172.31.241.72	





# Hardware & Software Compatibility

# IMPORTANT!!

- The following slide featuring support information may be out of date
- **ALWAYS** check the most up to date version of the UCS Director Compatibility Matrix
- The latest Compatibility Matrix and other supporting UCS Director documentation can be found at the following location:

[http://www.cisco.com/c/en/us/td/docs/unified\\_computing/ucs/ucs-director/doc-roadmap/b\\_UCSDirectorDocRoadmap.html](http://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/ucs-director/doc-roadmap/b_UCSDirectorDocRoadmap.html)

# UCS Director Cisco ACI Support (As of UCS Director 6.0)

## Supported Cisco ACI Hardware Platforms

- Support all Cisco ACI hardware platforms running a supported version of ACI software

## Supported Cisco ACI Software Versions

- 1.0(2\*)
- 1.0(3\*)
- 1.0(4\*)
- 1.1(1\*)
- 1.1(2\*)
- 1.1(3\*)
- 1.1(4\*)
- 1.2(1\*)
- 1.2(2\*)
- 1.3(1\*)
- 1.3(2\*)
- 2.0(1\*)

# UCS Director Cisco ACI Support (As of UCS Director 6.0)

with VMware vSphere

## Supported VMware Distributed Virtual Switch (DVS) Versions

- Support all VMware Distributed Virtual Switch (DVS) versions relative to supported VMware vSphere software versions
  - vSphere 5.0 (including Updates 1 and 2)
  - vSphere 5.1 (including Update 1)
  - vSphere 5.5 (including Updates 1b, 2d and 3b)
  - vSphere 6.0 (including Updates 1 and 2)

## Supported Cisco Application Virtual Switch (AVS) Versions

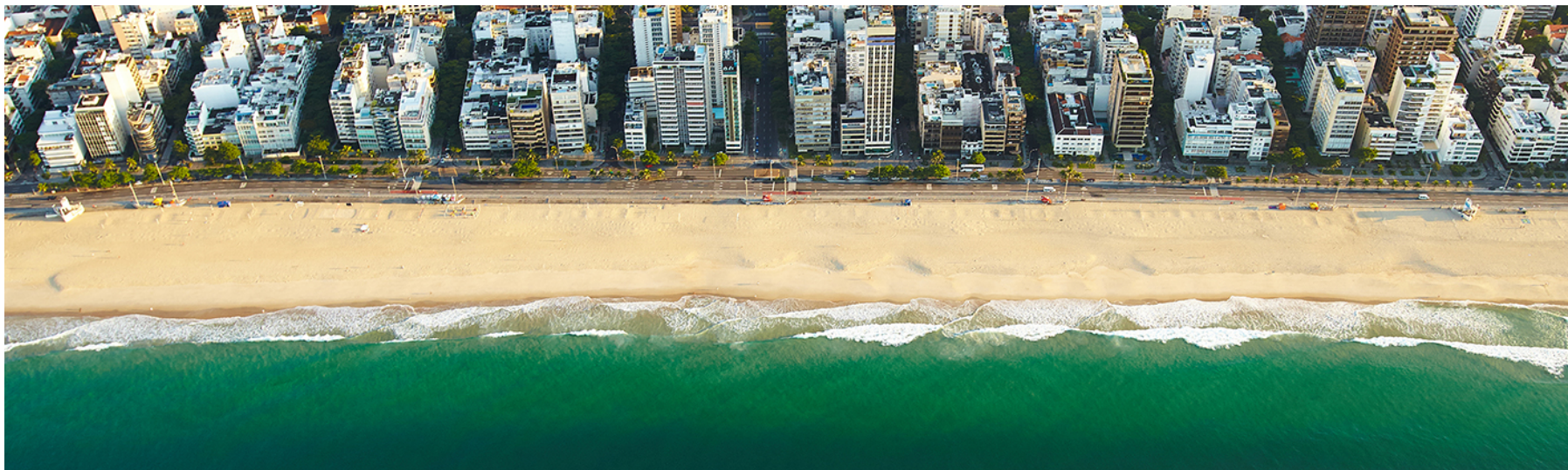
- 4.2(1)SV2(2.3)
- 5.2(1)SV3(1.5)
- 5.2(1)SV3(1.6)
- 5.2(1)SV3(1.10a)
- 5.2(1)SV3(1.15)

# UCS Director Cisco ACI Support (As of UCS Director 6.0)

with Microsoft Hyper-V

## Supported Microsoft Hyper-V Versions

- Microsoft System Center Virtual Machine Manager (SCVMM) **version 3.2.8xxx.x** for Windows 2012 R2, Rollup 9



# Licensing

# Licensing Information

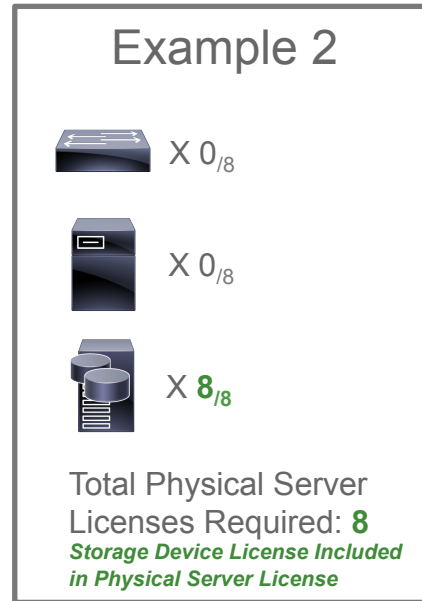
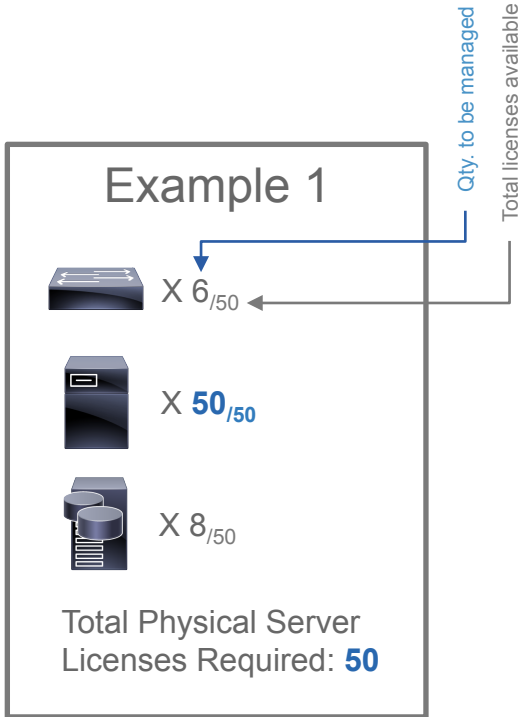
- UCS Director licensing is purchased solely in the form of physical server licenses
- However, included in each physical server license purchased is a storage device license and a network device license
- In addition to physical server tracking and licensing, UCS Director tracks the number of storage and network devices being managed against the number of licenses available
- If additional storage and/or network device licenses are required, they can be acquired by purchasing additional physical server licenses



# Licensing Information

- Each ACI “Leaf” node in the ACI fabric requires a UCS Director network device license
- ACI “Spine” nodes do not require a UCS Director network device license
- **NOTE!:** network device licenses are included in and solely available by purchasing additional physical server licenses

# Licensing Examples





# Orchestration Capabilities

# Orchestration Capabilities

## Tenants

- Create APIC Tenant
- Delete APIC Tenant

## Private Networks (VRFs)

- Create Private Network
- Delete Private Network
- Add Private Network Profile

## Bridge Domains

- Create Tenant Bridge Domain
- Modify Tenant Bridge Domain
- Delete Tenant Bridge Domain
- Add DHCP Label To Tenant Bridge Domain
- Delete DHCP Label From Tenant Bridge Domain

## Physical Domains

- Create Physical Domain
- Update Physical Domain
- Delete Physical Domain

## Attachable Access Entity Profiles

- Create Attachable Access Entity Profile
- Delete Attachable Access Entity Profile

## VMM Domains

- Create VMM Domain
- Update VMM Domain
- Delete VMM Domain
- Configure Hypervisor Function to Entity Profile

## Subnets

- Create Subnet To Bridge Domain
- Update Subnet To Bridge Domain
- Delete Subnet From Bridge Domain
- Create Subnet To EPG
- Delete Subnet To EPG
- Add Subnet To External Network
- Delete Subnet From External Network

## EPGs

- Create EPG
- Delete EPG
- Add Static Node To EPG
- Delete Static Node From EPG
- Add Static Path To EPG
- Delete Static Path From EPG
- Add Contract To EPG
- Delete Contract From EPG
- Add Domain To EPG
- Delete Domain From EPG
- Add Bridge Group Interface To EPG
- Delete Bridge Group Interface From EPG
- Delete ACE From ACL On EPG
- Add Interface To EPG
- Delete Interface From EPG
- Add ACL Entry To EPG
- Delete ACL From EPG

## Application Profiles

- Create Tenant Application Profile
- Delete Tenant Application Profile

## Contracts

- Create Consumed Contract Interface To EPG
- Modify Consumed Contract Interface To EPG
- Delete Consumed Contract Interface From EPG
- Add Filter To Contract Subject
- Delete Filter From Contract Subject
- Create Contract Subject
- Delete Contract Subject
- Modify Contract Subject
- Create Contract
- Get Contract Entities
- Get APIC Contracts
- Persist APIC Contract Result
- Delete APIC Contract Result
- Delete Contract
- Create Export Contract
- Delete Imported Contract
- Add Contract to External Network
- Delete Contract From External Network
- Add Label To Contract Subject
- Delete Label From Contract Subject
- Create Tenant Filter
- Create Tenant Filter Rule
- Delete Tenant Filter Rule
- Delete Tenant Filter
- Rename NetApp Cluster IPSpace
- Delete NetApp Cluster IPSpace

# Orchestration Capabilities Cont.

## Fabric Access Policies and Profiles

- Associate Access Port Selector To Interface Profile
- Delete Access Port Selector From Interface Profile
- Configure Interface PC and VPC
- Associate Interface Selector Profile To Switch Profile
- Delete Interface Selector Profile From Switch Profile
- Associate Switch Selector To Switch Profile
- Delete Switch Selector From Switch Profile
- Create Interface Profile
- Delete Interface Profile
- Create Leaf Policy Group
- Delete Leaf Policy Group
- Create Switch Profile
- Delete Switch Profile
- Create PC Interface Policy Group
- Delete PC Interface Policy Group
- Create vPC Interface Policy Group
- Delete vPC Interface Policy Group
- Create Access Port Policy Group
- Delete Access Port Policy Group

## Protocol Policies

- Create Link Level Policy
- Delete Link Level Policy
- Delete CDP Interface Policy
- Create CDP Interface Policy
- Update CDP Interface Policy
- Delete LLDP Interface Policy
- Create LLDP Interface Policy

## External Bridged/L2 Networks

- Add External Bridged Network
- Delete External Bridged Network
- Add External Network To External Bridged Network
- Delete External Network From External Bridged Network
- Create Node Profile To External Bridged Network
- Delete Node Profile To External Bridged Network
- Create L2 Domain
- Delete L2 Domain

## VLAN Pools

- Create VLAN Pool
- Delete VLAN Pool
- Add VLAN Range To VLAN Pool
- Delete VLAN Range From VLAN Pool

## External Routed/L3 Networks

- Add External Routed Network
- Delete External Routed Network
- Add Routed Control Profile To External Routed Network
- Delete Routed Control Profile From External Routed Network
- Add Logical Node to Logical Node Profile of External Routed Network
- Delete Logical Node From Logical Node Profile of External Routed Network
- Delete Logical Node Profile From External Routed Network
- Add External Network To External Routed Network
- Delete External Network From External Routed Network
- Add Static Route To Logical Node

## External Routed/L3 Networks (continued)

- Delete Static Route From Logical Node
- Create Logical Node Profile To External Routed Network
- Create BGP Peer Connectivity To Node Profile
- Delete BGP Peer Connectivity From Node Profile
- Add Interface To Interface Profile Add Interface To Logical Interface Profile
- Create Logical OSPF Interface Profile
- Delete Logical OSPF Interface Profile
- Create EIGRP Interface Profile
- Delete EIGRP Interface Profile Create L3 Domain
- Delete L3 Domain
- Create OSPF Interface Policy
- Create EIGRP Interface Policy
- Delete OSPF Interface Policy
- Delete EIGRP Interface Policy
- Create OSPF Timers
- Delete OSPF Timers
- Add Context To Routed Profile
- Delete Context From Routed Profile
- Add Interface Profile To Node Profile
- Add Logical Interface Profile To Logical Node Profile
- Delete Interface Profile from Node Profile
- Delete Logical Interface Profile from Logical Node Profile
- Delete Interface From Interface Profile
- Delete Interface From Logical Interface Profile
- Add Static Route To Interface On EPG
- Delete Static Route From Interface On EPG
- Create Action Rule Profile
- Modify Action Rule Profile
- Delete Action Rule Profile

# Orchestration Capabilities Cont.

## L4-L7 Services

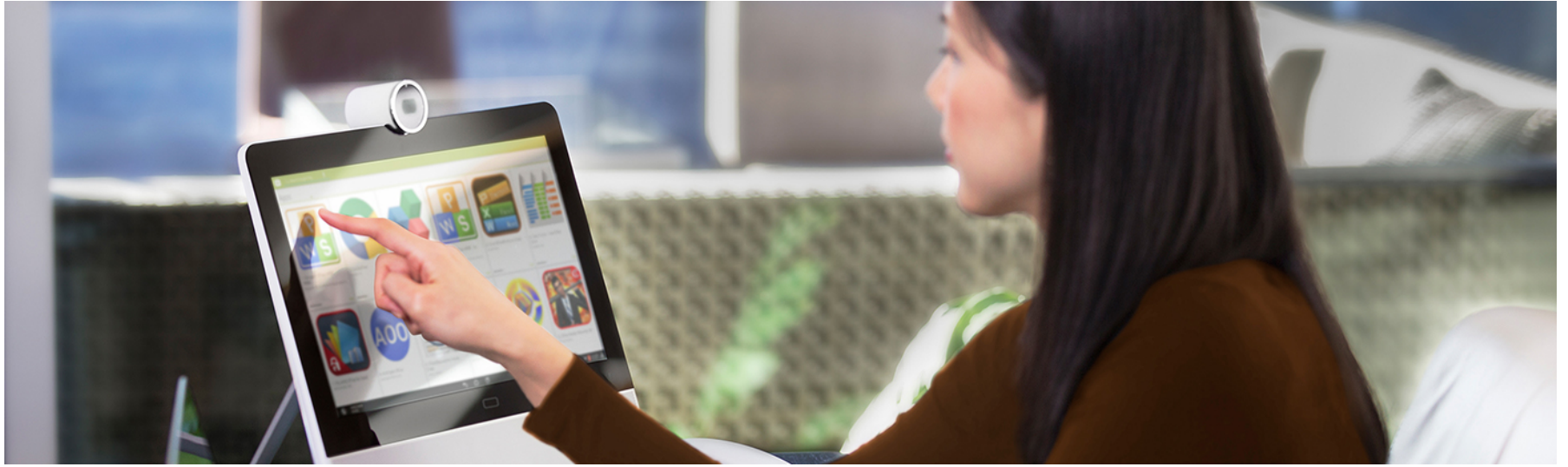
- Add Load Balancer Parameters To Function Node
- Delete LB SSL Offload Parameters From EPG
- Delete Load Balancer Parameters From Function Node
- Add Load Balancer Parameters To EPG
- Add Load Balancer Service Parameters To EPG
- Remove Load Balancer Service Parameters From EPG
- Delete Load Balancer Parameters To EPG
- Add Filter To Service Graph Node
- Delete Filter From Service Graph Node Modify L4-L7 Service Graph
- Delete L4-L7 Service Graph
- Create Logical Device Context
- Delete Logical Device Context
- Create Logical Interface Context
- Delete Logical Interface Context
- Add Bridge Group Interface To Function Node
- Delete Bridge Group Interface From Function Node
- Create L4-L7 Service Graph Create L4 L7 Service Graph Template
- Add Function Node to L4-L7 Service Graph
- Configure Failover For ASA
- Add Load Balancer Route Parameters To EPG
- Add SSL Offload Parameters to EPG
- Add Function Config Parameters To EPG
- Delete Function Config Parameters From EPG
- Update Connection to Node
- Add Interface To Function Node
- Delete Interface From Function Node
- Add Network Object Parameters To Function Node
- Add Function Config Parameters To Function Node

## L4-L7 Services (continued)

- Delete Network Object Parameters From Function Node
- Delete Function Node from L4-L7 Service Graph
- Create Function Profile Group
- Delete Function Profile Group
- Add Interface To Function Profile
- Delete Interface From Function Profile
- Add ACL Entry To Function Profile
- Delete ACL Entry From Function Profile
- Add Bridge Group Interface To Function Profile
- Delete Bridge Group Interface From Function Profile
- Add Network Object Parameters To Function Profile
- Delete Network Object Parameters From Function Profile
- Create Function Profile Copy Function Profile
- Delete Function Profile
- Add Function Config Parameters To Function Profile Delete Function Config Parameters From Function Profile
- Delete Function Config Parameters From Function Node
- Add ACL Entry To Function Node
- Delete ACL Entry From Function Node
- Delete ACE From ACL on Function Node Create Device Cluster
- Create Device Cluster Concrete Device
- Add Interface To Concrete Device
- Add Interfaces To Device Cluster
- Delete Concrete Interface From Device
- Delete Device Cluster Concrete Device Delete Failover Configuration For ASA
- Delete Device Cluster Export Device Cluster

## L4-L7 Services (continued)

- Delete Imported Device Cluster
- Add NS Parameters To Device Cluster Configure Port Channel Members To L4 L7 Device
- Delete Port Channel Members From L4 L7 Device
- Configure NTP Parameters To L4 L7 Device Configure SNMP Parameters To L4 L7 Device
- Add Logical Interface to Device Cluster
- Delete Logical Interface from Device Cluster
- Create ND Interface Policy
- Delete ND Interface Policy
- Modify L4-L7 Parameter Value
- Associate Access List To Interface
- Disassociate Access List From Interface



# Reports



# Tabular Reports and Information

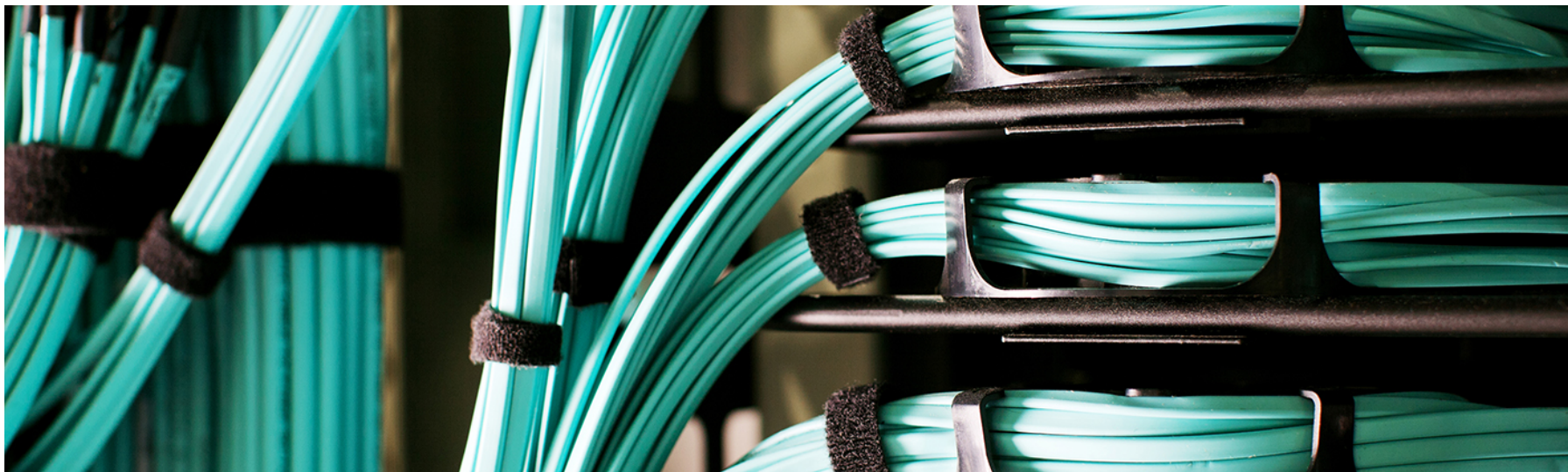
## *At ACI Fabric Level*

- Fabric Nodes
- System
- Fabric Memberships
- Physical Domains
- Tenants Health
- Nodes Health
- Access Entity Profile
- Link Level Policy
- VLAN Pool
- CDP Interface Policy
- LLDP Interface Policy
- Leaf Policy Groups
- Tenants
- L3 Domain
- L2 Domain
- VM Networking
- L4-L7 Service Device Types
- Fabric Nodes Topology
- L2 Neighbors
- Deployed Service Graph
- EPG to Contract Association
- Access Port Policy Profiles
- Fabric Interface Profiles
- Fabric Configured Switch Interfaces
- Fabric Switch Profiles

# Tabular Reports and Information

## *At ACI Tenant Level*

- Application Profile
- Deployed Service Graph
- Filters
- External Bridge Network
- External Routed Network
- Bridge Domains
- Private Networks
- BGP Timers
- Contracts
- Taboo Contracts
- Relay Policy
- Option Policy
- End Point Retention
- OSPF Interface
- EIGRP Interface
- OSPF Timers
- IFMP Snoop
- Custom Qos
- Action Rule Profile
- L4-L7 Service Graph
- Function Profile Group
- Device Clusters
- Deployed Device Cluster
- Imported Device Cluster
- Logical Device Context



# Example Use-Cases

# Example Use-Cases

- Use-Case #1: Create New vPC-attached Physical Domain in ACI Fabric
- Use-Case #2: Create New 3 Tier Application Profile in ACI

# Use Case #1: Create New vPC-attached Physical Domain in ACI Fabric

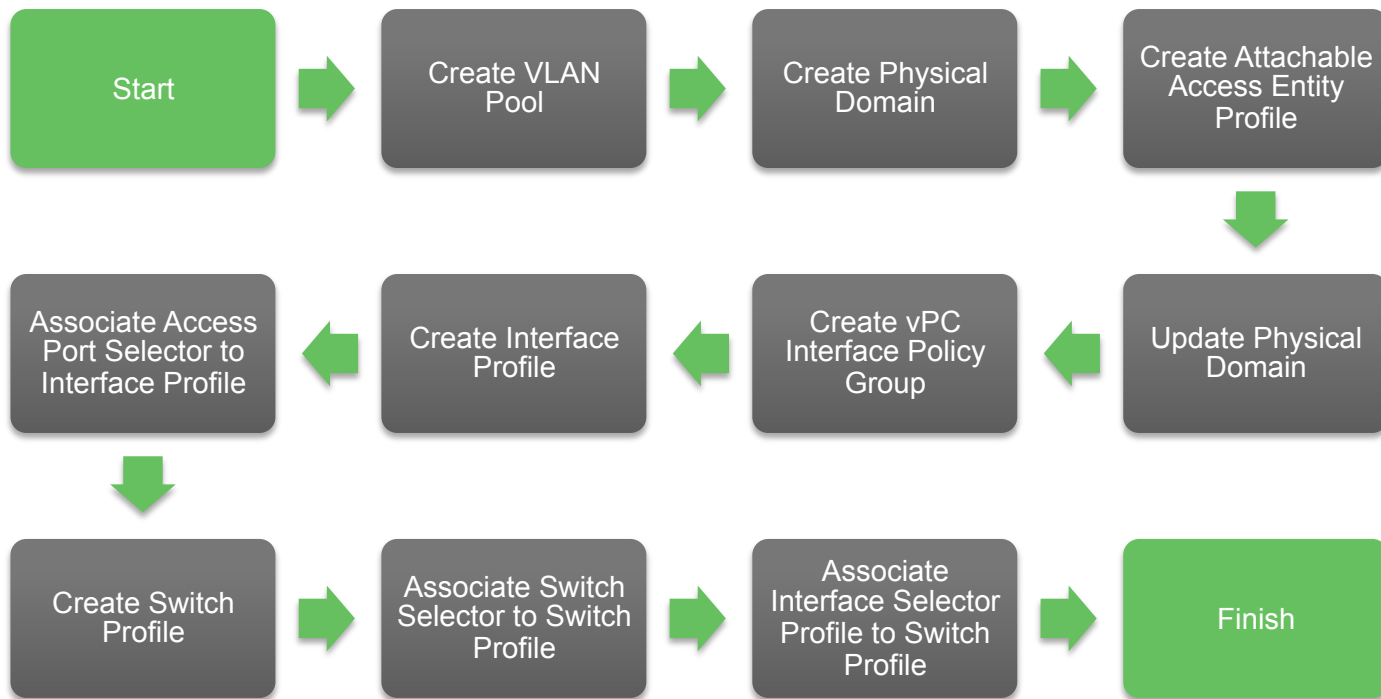
- The following use case example highlights how to automate the provisioning and configuration of a new Physical Domain connected by a vPC across two leaf nodes in the ACI Fabric
- Configuration includes the following related to the Physical Domain...
  - VLAN Pool
  - Attachable Access Entity Profile
  - VPC Interface Policy Group
  - Interface Profile
  - Switch Profile

# Use Case #1: Create New vPC-attached Physical Domain in ACI Fabric

Prerequisites that must be in place before running this use-case (workflow)

- ACI fabric (spine and leaf nodes) must be configured and discovered by APIC controllers
- New device (physical domain) must be physically cabled with a connection to the same interfaces on two leafs in the fabric
  - For example, Eth 1/12 on both leaf 1 and leaf 2

# Use Case #1: Create New vPC-attached Physical Domain in ACI Fabric





# Use Case #1: Create New vPC-attached Physical Domain in ACI Fabric

- Use Case #1 workflow can be downloaded from the UCS Director community site here:

<https://communities.cisco.com/docs/DOC-69253>

- The UCS Director community site also includes other workflows, custom tasks and information

# Use Case #2: Create New 3 Tier Application Profile in ACI

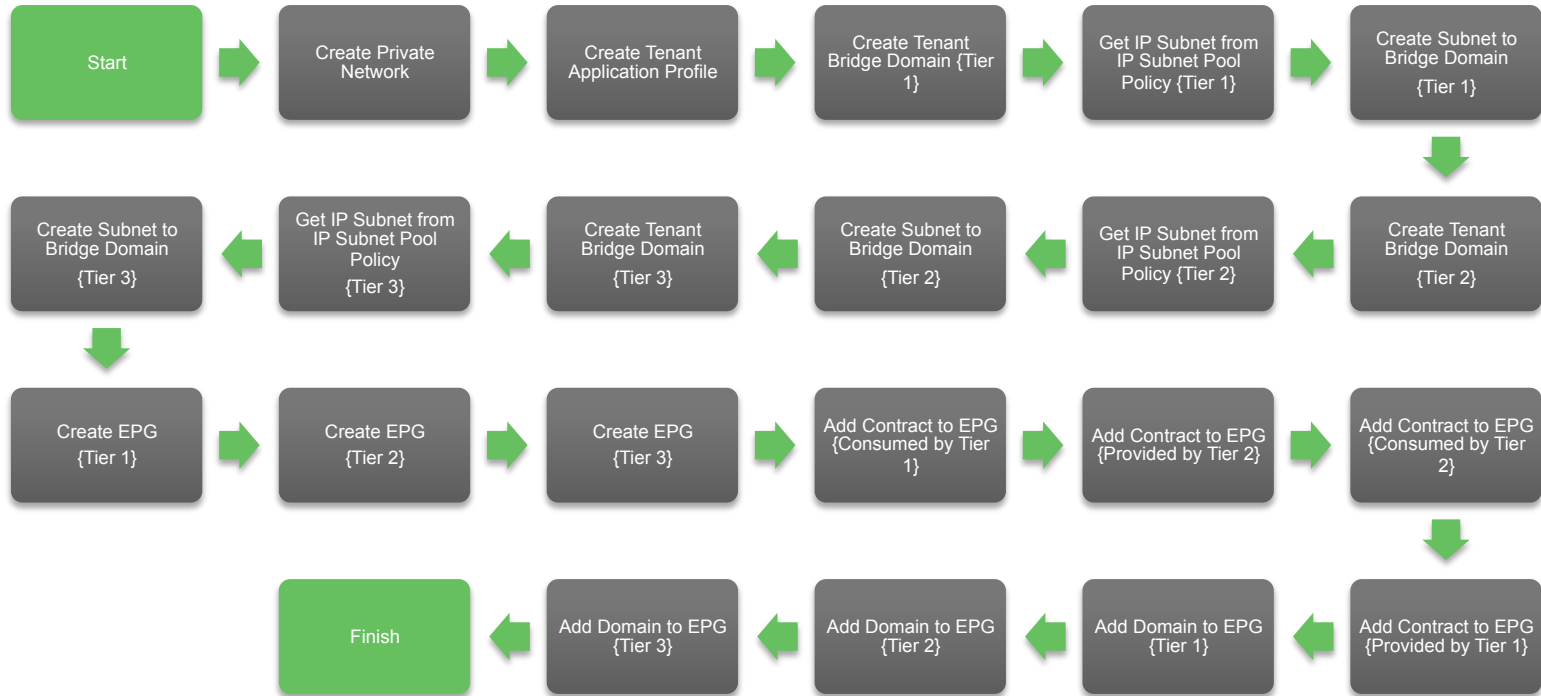
- The following use case example highlights how to automate the provisioning and configuration of a new Application Profile for an example 3 tier application
- Configuration includes the following related to the Application Profile...
  - Private Network
  - Bridge Domains
  - Subnets
  - End Point Groups
  - Contracts
  - Adding VMM Domain to EPGs to Create Portgroups

# Use Case #2: Create New 3 Tier Application Profile in ACI

Prerequisites that must be in place before running this use-case (workflow)

- ACI fabric (spine and leaf nodes) must be configured and discovered by APIC controllers
- VMM Domain must be added to the ACI fabric
- One or more ACI tenants must be created

# Use Case #2: Create New 3 Tier Application Profile in ACI



# Use Case #2: Create New 3 Tier Application Profile in ACI

- Use Case #2 workflow can be downloaded from the UCS Director community site here:

<https://communities.cisco.com/docs/DOC-69314>

- The UCS Director community site also includes other workflows, custom tasks and information



**CISCO**

*TOMORROW starts here.*