



Cisco *live!*

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Programing the ACI Fabric

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LTRACI-3225



Lab Proctors



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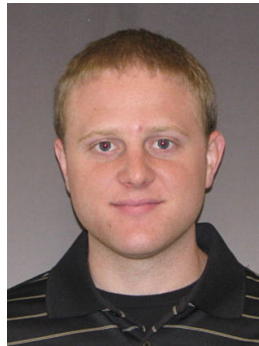


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Agenda

- Why model based?
- ACI Interface
- About the lab

Why model based?

Why model based?

Command line and graphical user interfaces are designed for human consumption of data

```
interface Ethernet1/31
  switchport mode trunk
  switchport trunk allowed vlan 58,96-97
  channel-group 27 mode active

# show interface ethernet 1/31
Ethernet1/31 is up
Dedicated Interface
Belongs to Po7
Hardware: 10Gb Ethernet, address:
```

Why modal based?

*Human
readable*
text makes it
complicated
to extract
structured
data

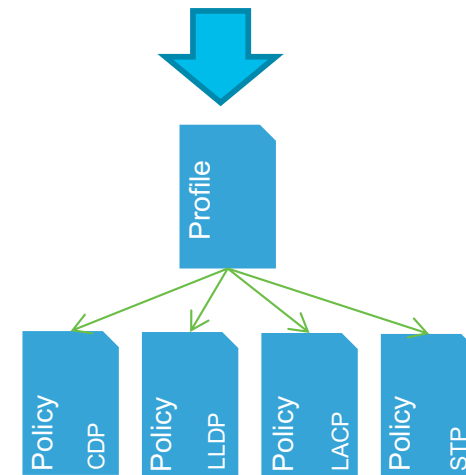
```
(Eth\d\\d+)(\s+)(\d+)(\s+)(\w+)(\s+)(\w+)(\s+)(\w+)(\s+)(\w+)(\s+)(\d+\w)
```

Ethernet Interface	VLAN	Type	Mode	Status	Reason	Speed	Port Ch #
Eth1/1	1	eth	fabric	up	none	10G(D)	101
Eth1/2	1	eth	fabric	up	none	10G(D)	102
Eth1/3	1	eth	fabric	up	none	10G(D)	103
Eth1/4	1	eth	fabric	up	none	10G(D)	104
Eth1/5	1	eth	fabric	up	none	10G(D)	105
Eth1/6	1	eth	fabric	up	none	10G(D)	106
Eth1/7	1	eth	fabric	up	none	10G(D)	107
Eth1/8	1	eth	fabric	up	none	10G(D)	108
Eth1/9	1	eth	fabric	up	none	10G(D)	109
Eth1/10	1	eth	fabric	up	none	10G(D)	110
Eth1/11	1	eth	fabric	up	none	10G(D)	111
Eth1/12	1	eth	fabric	up	none	10G(D)	112

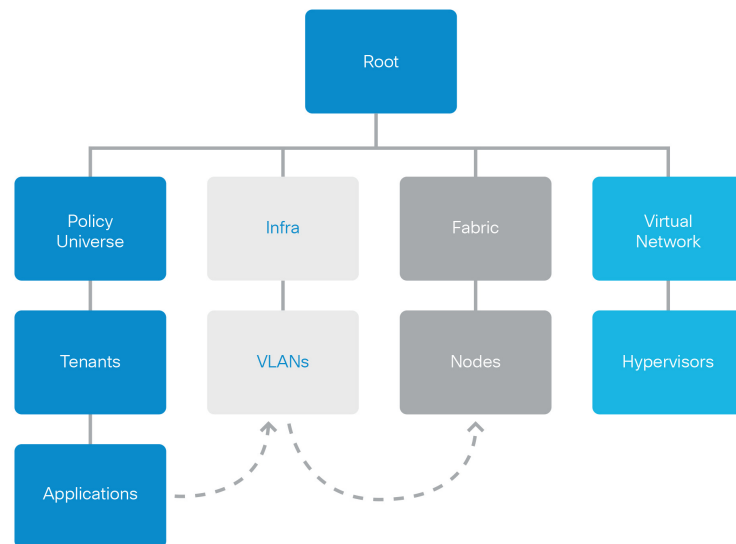
Why modal based?

ACI moves away from text based management to *object based* management that is *structured data* for *machine consumption*

```
interface Vlan13
  no ip redirects
  ip address 10.1.13.2/24
  ip address 14.1.13.2/24 secondary
  ip verify unicast source reachable-via any
  ip router ospf SVS-RTP-Lab area 0.0.0.0
  hsrp 1
  preempt
```



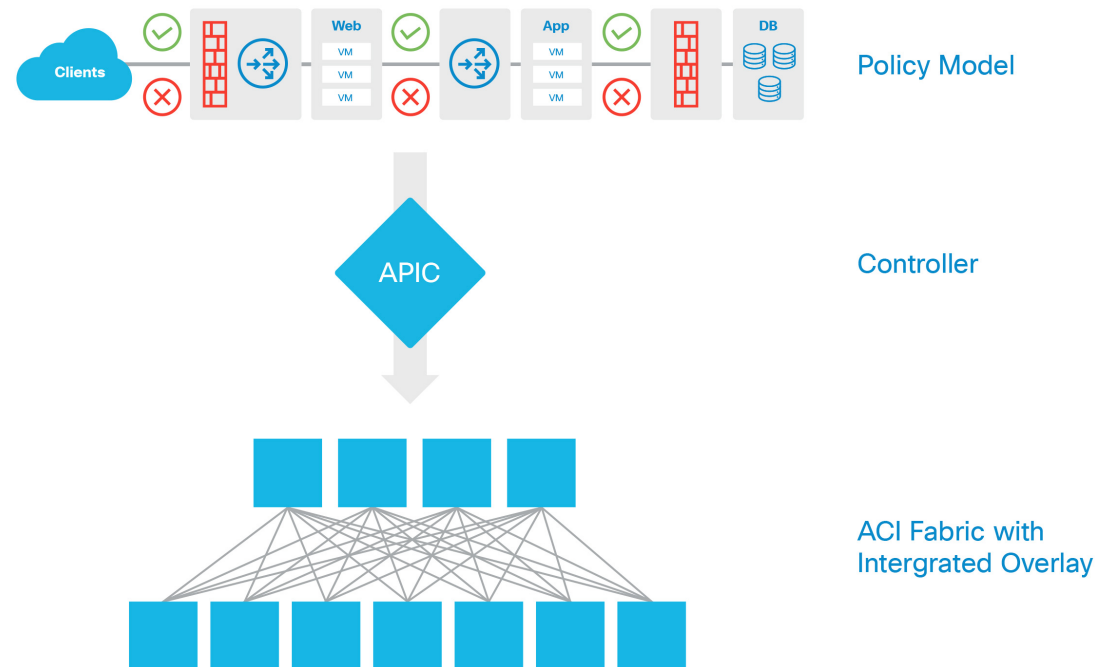
ACI Models



- Everything in ACI is represented in the Management Information Tree (MIT).
- Each node in the tree is a managed object (MO)
- Each object is represented in the fabric in a specific distinguished name (DN)

ACI Models

- The user intention is captured by the APIC controller and the policy model
- The APIC controller takes that configuration intention and converts it into specific hardware instructions that are placed on devices across the fabric.



ACI Models

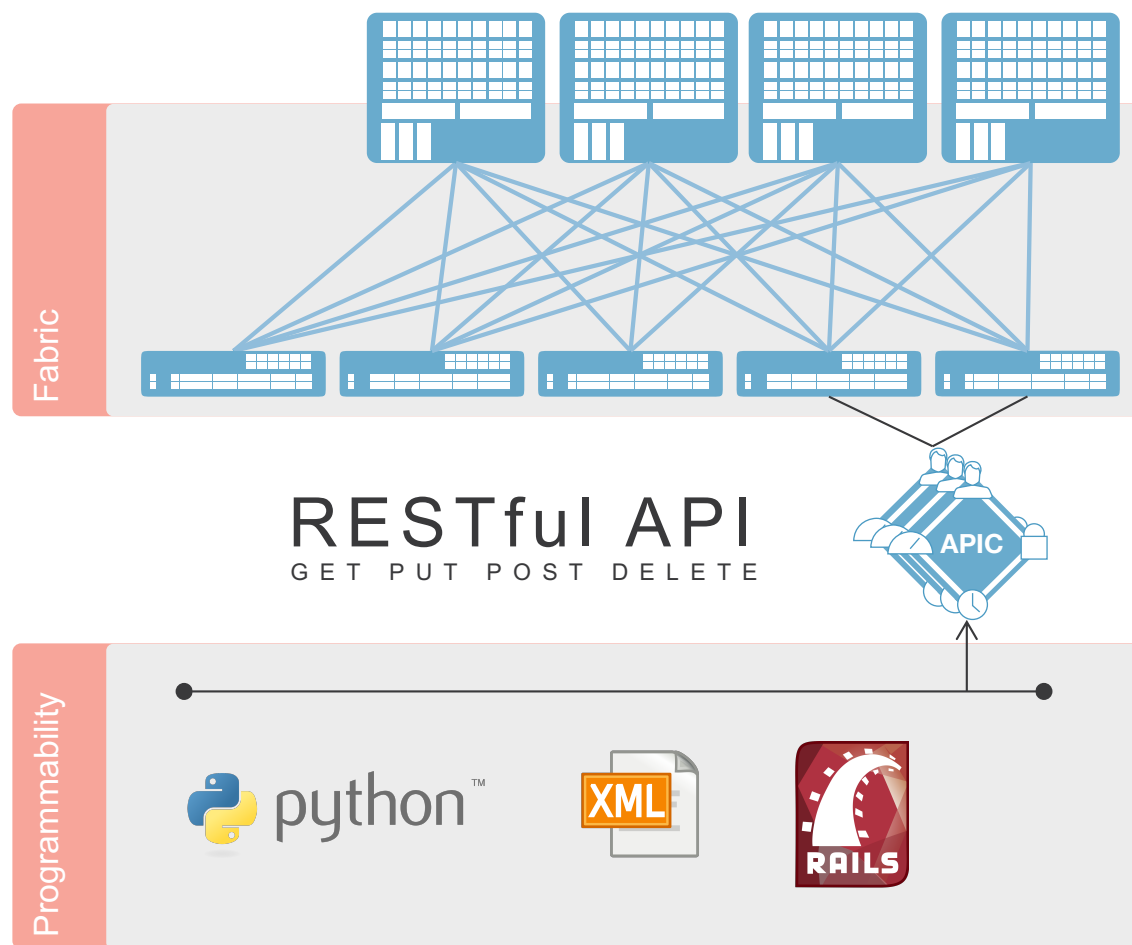
- Model/object based access simplifies writing code to extract or modify data in the ACI fabric

```
{
  "infraAccBndlGrp": {
    "attributes": {
      "descr": "",
      "dn": "uni/infra/funcprof/accbundle-cloud_serv1",
      "lagT": "node",
      "name": "cloud_serv1",
      "nameAlias": "",
      "ownerKey": "",
      "ownerTag": ""
    },
    "children": [{
      "infraRsLldpIfPol": {
        "attributes": {
          "tnLldpIfPolName": ""
        }
      }
    }, {
      "infraRsLacpPol": {
        "attributes": {
          "tnLacpLagPolName": "LACP-ACTIVE"
        }
      }
    }
  ]
}
```

ACI Interface

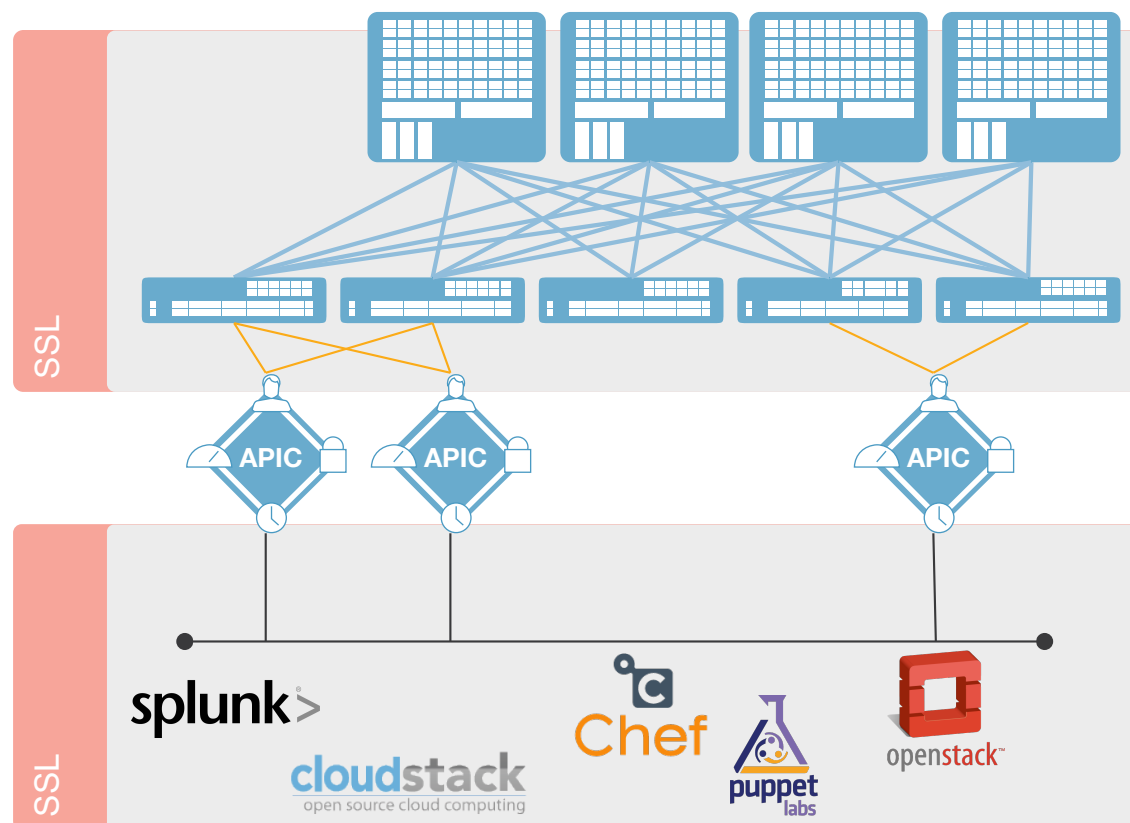
RESTful API

- APIC is 100% based on programmatic API
 - Inside fabric uses same API between APIC and leaf/spine nodes
- APIC GUI uses same REST API as available to all users
- All objects can be exported/imported via XML or JSON (same as having yesterdays configuration files)



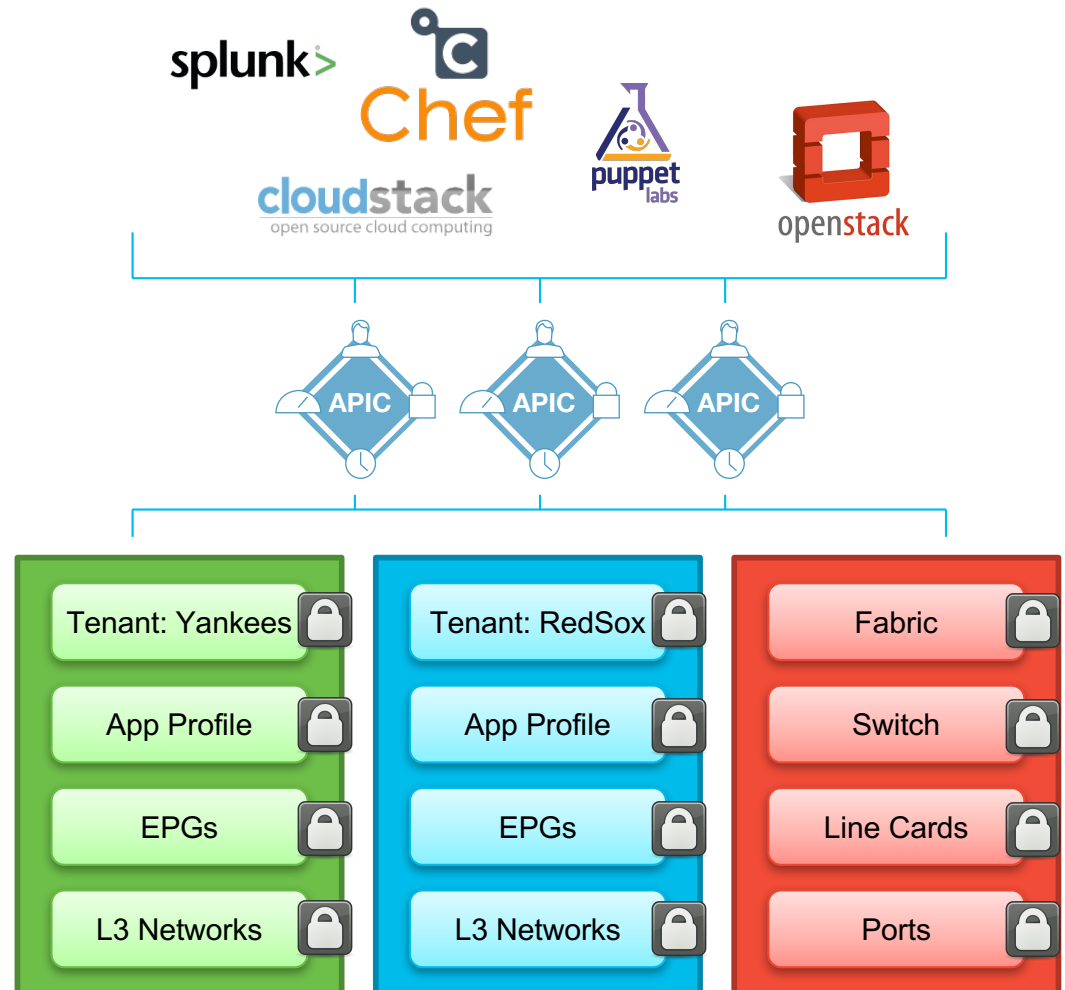
Application Policy Infrastructure Controller

- HTTP and HTTPS Northbound interfaces to APIC
- HTTP can be redirected to HTTPS
- APIC will generate a self-signed certificate on install of first node in the cluster
- Recommended to install the same signed certificate across all nodes in the APIC cluster
- APIC acts as an HTTPS Reverse Proxy for access to MO's located on the switches (Concrete Model MO's)



RBAC Controls

- Local & External AAA (TACACS+, RADIUS, LDAP) Authentication & Authorization
- RBAC to control READ and WRITE for ALL Managed Objects
- RBAC to enforce Fabric Admin and per-Tenant Admin separation



About the lab

About the lab

- VNC is used to access the lab from your hardware NUC at Cisco Live
- Each student has a specific POD that you will use during the lab
- As a student you don't have root access to the CentOS Linux machine



About the lab

- Web based lab guide
- Make sure you select the right POD from the menu
- Stick to using Google Chrome



About the lab

- The lab guide also provides you a indicator of how you are progressing through the lab.
- Some sections are longer than others.

Lab Progress




About the lab

- Any interaction with the Linux Terminal will be indicated with the following look:

```
pod1 ~ $ cd ~  
pod1 ~ $ atom .bashrc
```

- Any code related content is represented with the following look:



```
~/requests/req-aci.py  
1 import requests, json
```

About the lab

- You will progressively make changes to the lab with explanations
- The page will highlight what needs to be updated from step to step
- Each window has the ability to copy the whole block of text, but we encourage you to write along.



```
~/requests/req-aci.py
1 import requests, json
2
3 apic_ip = '10.0.226.41'
4 apic_username = 'aciproglab01'
5 apic_password = 'cisco.123'
6 credentials = {'aaaUser':
7               {'attributes':
8                 {'name': apic_username, 'pwd': apic_password }
9               }
10             }
11
12 base_url = 'https://%s/api/' % apic_ip
13 login_url = base_url + 'aaaLogin.json'
14
```

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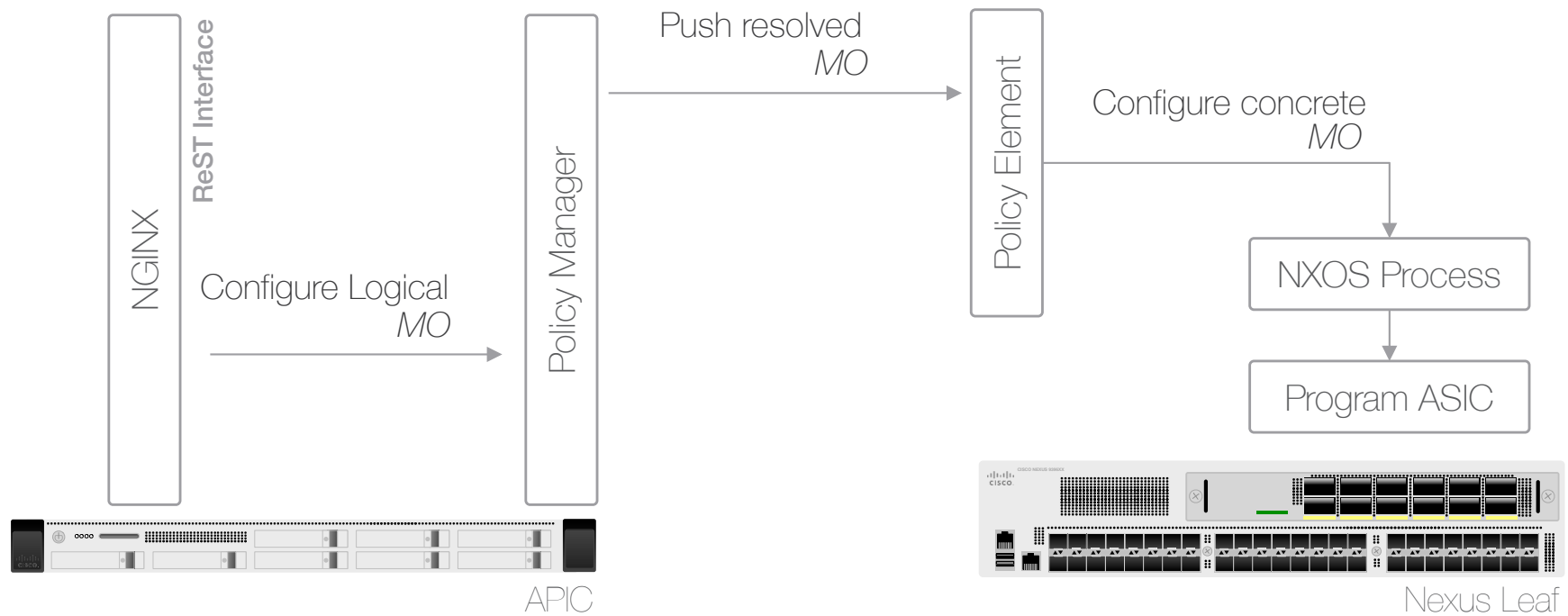
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From logical to concrete



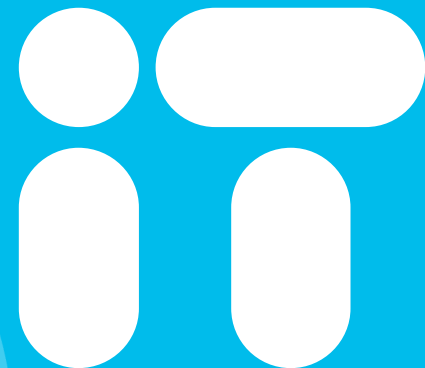


Thank you

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You're



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Data Center / Virtualization Cisco Education Offerings

Course	Description	Cisco Certification
Introducing Cisco Data Center Networking (DCICN); Introducing Cisco Data Center Technologies (DCICT)	Get job-ready foundational-level certification and skills in installing, configuring, and maintaining next generation data centers.	CCNA® Data Center
Implementing Cisco Data Center Unified Computing v6.0 (DCUCI) Implementing Cisco Data Center Infrastructure v6.0 (DCII) Implementing Cisco Data Center Virtualization and Automation v6.0 Designing Cisco Data Center Infrastructure v6.0 (DCID) Troubleshooting Cisco Data Center Infrastructure v6.0 (DCIT)	Obtain professional level skills to design, configure, implement, troubleshoot next generation data center infrastructure.	CCNP® Data Center
Product Training Portfolio:DCAC9K, DCINX9K, DCMDS, DCUCS, DCNX1K, DCNX5K, DCNX7K, HFLEX200 UCSDF, UCSDACI, DCUCCEN	Gain hands-on skills using Cisco solutions to configure, deploy, manage and troubleshoot unified computing, policy-driven and virtualized data center infrastructure.	
Designing the FlexPod® Solution (FPDESIGN); Implementing and Administering the FlexPod® Solution (FPIMPADM)	Learn how to design, implement and administer FlexPod® solutions	Cisco and NetApp Certified FlexPod® Specialist
Designing the VersaStack Solution (VSDESIGN); Implementing and Administering the VersaStack Solution (VSIMP)	Learn how to design, implement and administer VersaStack solutions	

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Network Programmability Cisco Education Offerings

Course	Description	Cisco Certification
Developing with Cisco Network Programmability (NPDEV)	Provides Application Developers with comprehensive curriculum to develop infrastructure programming skills; Addresses needs of software engineers who automate network infrastructure and/or utilize APIs and toolkits to interface with SDN controllers and individual devices	Cisco Network Programmability Developer (NPDEV) Specialist Certification
Designing and Implementing Cisco Network Programmability (NPDESI)	Provides network engineers with comprehensive soup-to-nuts curriculum to develop and validate automation and programming skills; Directly addresses the evolving role of network engineers towards more programmability, automation and orchestration	Cisco Network Programmability Design and Implementation (NPDESI) Specialist Certification
Programming for Network Engineers (PRNE)	Learn the fundamentals of Python programming – within the context of performing functions relevant to network engineers. Use Network Programming to simplify or automate tasks	Recommended pre-requisite for NPDESI and NPDEV Specialist Certifications
Cisco Digital Network Architecture Implementation Essentials (DNAIE)	This training provides students with the guiding principles and core elements of Cisco's Digital Network Architecture (DNA) architecture and its solution components including; APIC-EM, NFV, Analytics, Security and Fabric.	None

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