



Introduction to Cisco Platforms & API

NXOS & ACI

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Agenda

NX-API

APIs on Cisco NXOS Platform

ACI API

Cisco Application Centric Infrastructure REST API

API Tools

Visore / Developer Sandbox / API Inspector

Open NXOS

Open NXOS Platform



Cisco Datacenter Networking Platforms

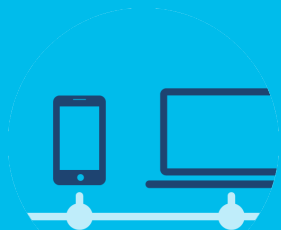
Solutions for core datacenter applications



Cisco NXOS



Cisco ACI



NX-API CLI
REST



NX-API CLI

Cisco NX-OS CLI commands in a structured data format (JSON or XML)



HTTP/HTTPS “POST”

Custom build

Supports XML / JSON-RPC / JSON

Uses backend NGNIX http server hosted on switch itself

“POST” NXOS CLI CMDs

NX-API uses HTTP/HTTPS as its transport

CLIs are encoded into the HTTP/HTTPS POST body

Further Reads at:

https://www.cisco.com/c/en/us/td/docs/switches/datacenter/nexus9000/sw/7-x/programmability/guide/b_Cisco_Nexus_9000_Series_NX-OS_Programmability_Guide_7x/NX_API.html

NX-API CLI

Cisco NX-OS CLI commands in a structured data format (JSON or XML)



```
import requests
import json

url='http://172.16.109.140/ins'    #"ins" stands for Insieme

switchuser='admin'
switchpassword='admin@123'

myheaders={'content-type':'application/json-rpc'}
payload={
    "jsonrpc": "2.0",
    "method": "cli", #JSON-RPC specifying remote method is "cli"
    "params": {
        "cmd": "show version",
        "version": 1.2
    },
    "id": 1
}

response = requests.post(
    url,
    data=json.dumps(payload),
    headers=myheaders,
    auth=(switchuser,switchpassword)
).json()

print(json.dumps(response,indent=2,sort_keys=True))
```

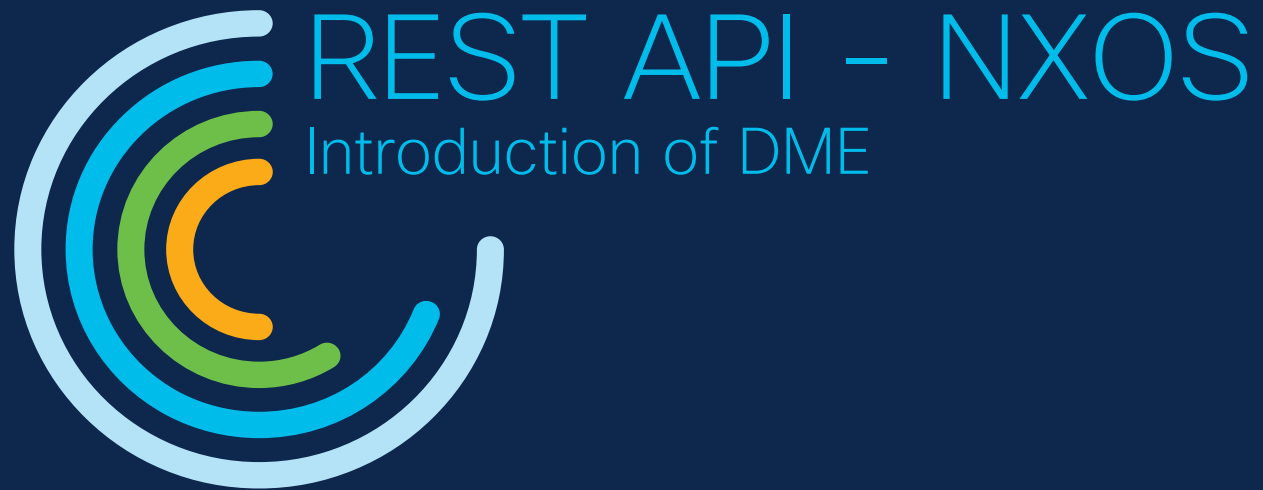
Quiz Time

Go to www.menti.com and use the code 94 30 43



*“NX-API CLI uses “POST”
– it must be a RESTful API”*

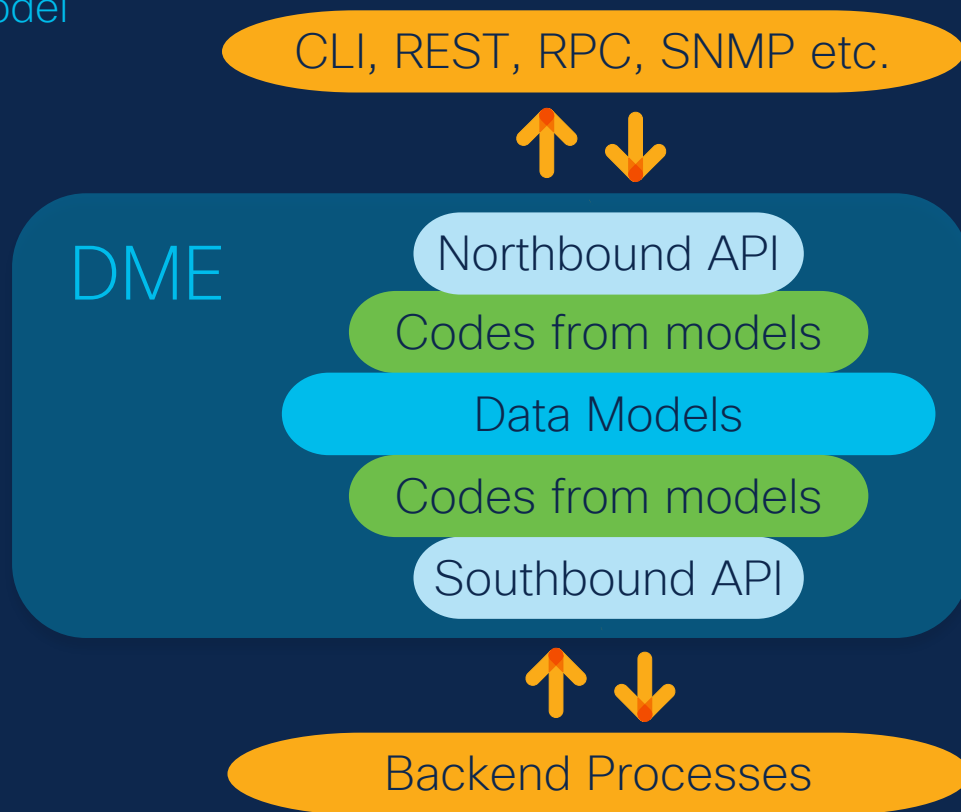






DME- DM

Data Management Engine – Data Model



DME

Data Management Engine



Managed Objects (MO)

Everything is an Object

DME Models NX-API REST into managed object (MO)

Nodes in the MIT* represents a managed object (MO)

North/Southbound API

Quick XML / JSON Translation – “show version | xmlin”

DME show commands:

show system internal dme running-config all dn sys

Further Reads at:

<https://developer.cisco.com/docs/nx-os/#!/data-management-engines>

DME Properties

Transactional
Atomicity, Consistency
Isolation, Durability

Model-driven architecture
Representation of Data

Multi-threaded
Everything is an object

Upgradable
Add new features / protocols
or entire methods

NX-API REST

REST API brings Model Driven Programmability (MDP) to standalone (non-APIC-based fabric) Nexus family switches



NX-API REST SDK

In 7.0(3)X train, the NX-API REST SDK has been added.

show cmds, basic, advanced switch configurations and Bash

Uses backend NGNIX http server

Data Models

Base URL:

[https://<system>/api/\[mo|class\]/\[dn|class\]\[:method\].\[xml|json\]?{options}](https://<system>/api/[mo|class]/[dn|class][:method].[xml|json]?{options})

Open-Config: YANG Models

<https://github.com/YangModels/yang/tree/master/vendor/cisco/nx>

Further Reads at:

<https://developer.cisco.com/site/nxapi-dme-model-reference-api/>

Quiz Time

Go to www.menti.com and use the code 94 30 43



*“NX-API REST uses which
Data-Modeling Language ”*



NX-API

The logo graphic for NX-API consists of three vertical bars of increasing height from left to right, colored light blue, green, and orange. Each bar has five horizontal lines representing data or code.

Developer Sandbox



NX-API Developer Sandbox

A web form hosted on the switch, translates NX-OS CLI commands into equivalent XML or JSON payloads



NX-API CLI Developer Sandbox

Transition tool (enable feature nxapi)

<http://172.16.109.140/>

Further Reads at:

https://www.cisco.com/c/en/us/td/docs/switches/datacenter/nexus9000/sw/7-x/programmability/guide/b_Cisco_Nexus_9000_Series_NX-OS_Programmability_Guide_7x/b_Cisco_Nexus_9000_Series_NX-OS_Programmability_Guide_7x_chapter_010010.html

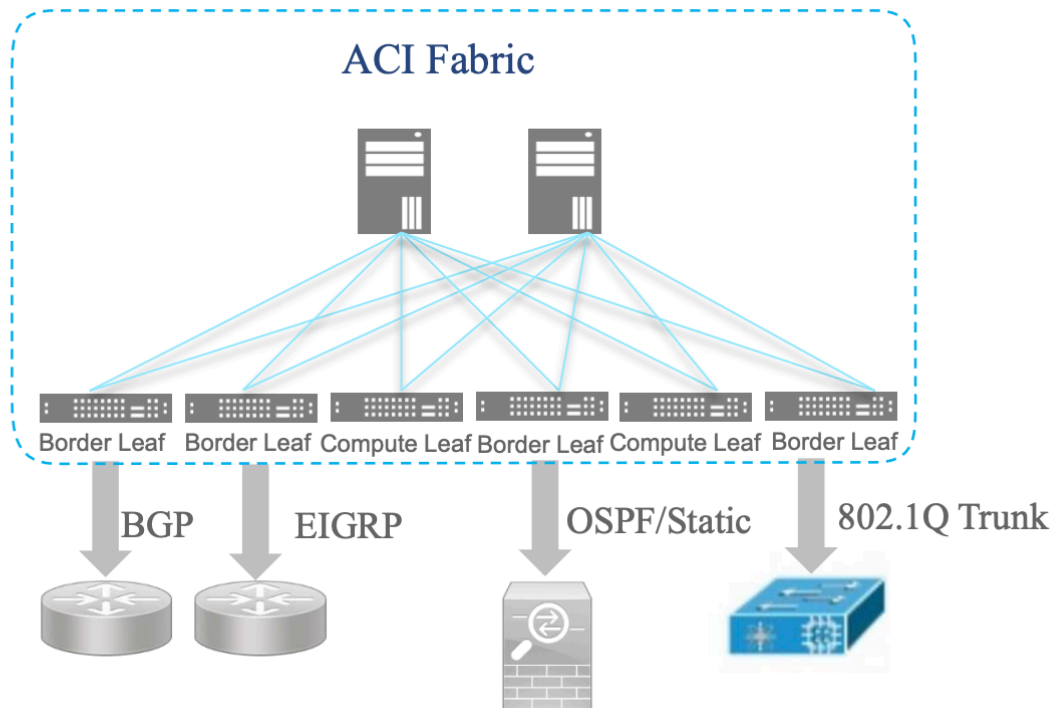


ACI

Application Centric Infrastructure



ACI Fabric



ACI – How to setup?

Boot APIC

Cluster of controller (3<=>9)

CIMC addressing of VMs

External Connectivity

Add VMM / BMT
/ L2 / L3 Outs

Maintenance

Updates EPGs, tenants, Bridge Domains, VRFs, Contracts Service Graphs etc

Phase 1

Phase 2

Phase 3

Phase 4

Phase 5

Wizard Walk-through

TEP addressing / NAT / Credentials.
Builds Underlay

(i-Vxlan)

Create Config

Create EPGs, tenants, Bridge Domains, VRFs, Contracts Service Graphs etc.

ACI – Sandbox

Cisco ACI DevNet Sandbox – “Always On”



DevNet ACI Sandbox

ACI Simulator

<https://sandboxapicdc.cisco.com>

Further Reads at:

<https://developer.cisco.com/docs/aci/>

ACI – Sandbox

Cisco ACI DevNet Sandbox – “Always On”



```
import requests
import json
url =
"https://sandboxapicdc.cisco.com:443/a
pi/aaaLogin.json"
```

```
payload = "{\n \"aaaUser\":{\n
\"attributes\":{\n
\"name\": \"admin\", \n
\"pwd\": \"ciscopsdt\" \n } \n } \n } \n"
headers = {'Content-Type':
'application/json'}
```

```
response = requests.request("POST",
url, data=payload, headers=headers,
verify=False)
data = response.json()
print(type(data))
print(response.text)
```

ACI – Toolkit

Cisco ACI Toolkit



ACI Toolkit

Python Libraries

Basic ACI configs

Cisco Community:

<https://community.cisco.com/t5/automation-and-analytics/bd-p/j-disc-dev-net-auto-analytics>

Further Reads at:

<https://github.com/datacenter/acitoolkit>

VISORE



Visore is an Italian word,
which translates to Viewer



Visore – ACI

Cisco ACI



Visore

Italian word, translates to “Viewer”

Browse and navigate the management objects (MOs) in MIT*

<https://sandboxapicdc.cisco.com/visore.html>

Further Reads at:

<https://www.cisco.com/c/en/us/support/docs/cloud-systems-management/application-policy-infrastructure-controller-apic/118839-technote-visore-00.html>



API Inspector

Visore is an Italian word,
which translates to Viewer



API Inspector

Cisco ACI



Web Tool

Real-Time view of REST API rendered ACI Web-GUI

<http://sandboxapicdc.cisco.com>

1. Log in to the APIC GUI.
 2. Upper RHS corner of the Web-GUI, click the gear icon to view the drop-down list.
 3. In the drop-down list, choose the Show API Inspector.
- The API Inspector opens in a new browser window.

Further Reads at:

https://www.cisco.com/c/en/us/td/docs/switches/datacenter/aci/apic/sw/1-x/api/rest/b_API_C_RESTful_API_User_Guide/using_tools_for_api_development_and_testing.html#d6474e26a1635

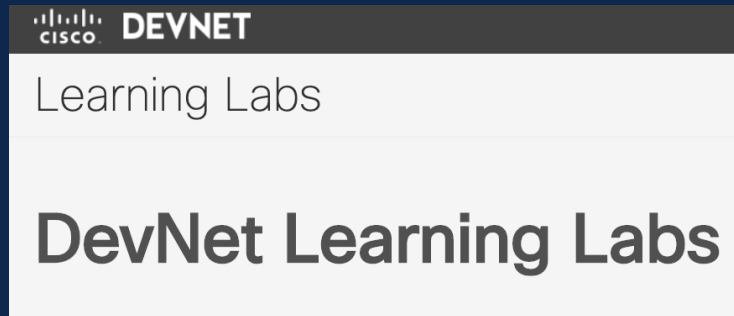
Important References

Use this to learn about all the programmability options available with Open NX-OS & AC

DevNet Learning Labs

Track-wise assisted learning modules with labs

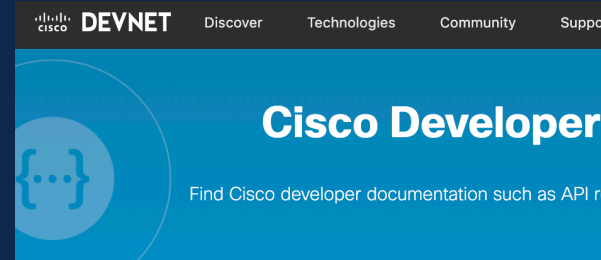
<https://developer.cisco.com/learning/>



Cisco Developer Documentation

API references, getting started guides & examples

<https://developer.cisco.com/docs/>





Open NXOS

What's 'Open'?



Open – NXOS

Open NX-OS on the Cisco Nexus platform exposes APIs, data models, and programmatic constructs



Switch as Linux Device

Exposed interfaces as linux netdevices

Linux utilities (e.g. Bash) to configure, troubleshoot

Linux containers (LXC)s support (GuestShell)

Flexible Programming Options

Python Libraries

NX-API CLI

NX-API REST

Further Reads at:

<https://developer.cisco.com/docs/nx-os/#!/linux-networking>

Cisco NXOS

Bash & GuestShell*

Linux Kernel
This is placeholder content.

Bash Shell
feature bash-shell
run bash

NXOS Shell
NXOS CLI syntax

Guest-Shell
feature guest-shell*
run guestshell
LXC (Linux Container)



Questions?

Open to floor...



