

Cisco Certified DevNet Associate Certification (DEVASC 200 – 901) Introduction

A LOOK AT OUR HISTORY...

Programming Skills

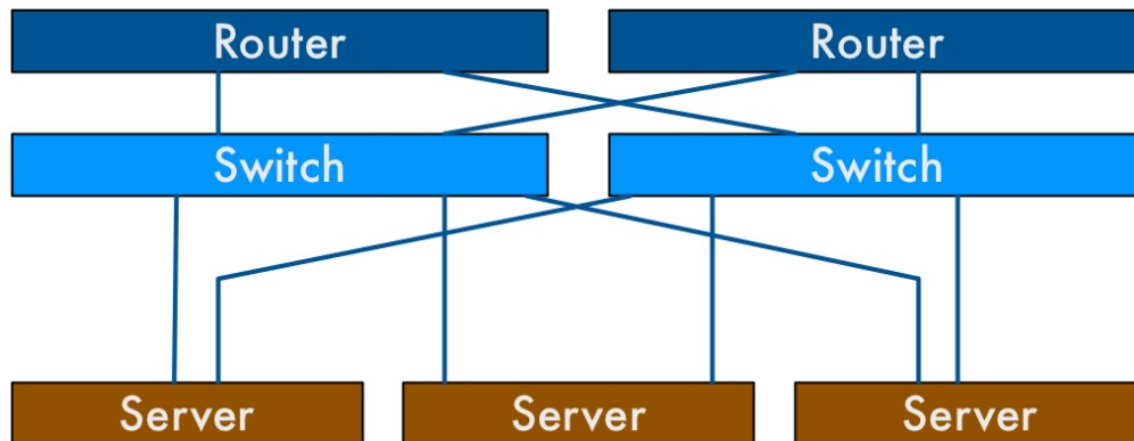
- TCL
- EEM
- Expect Scripts



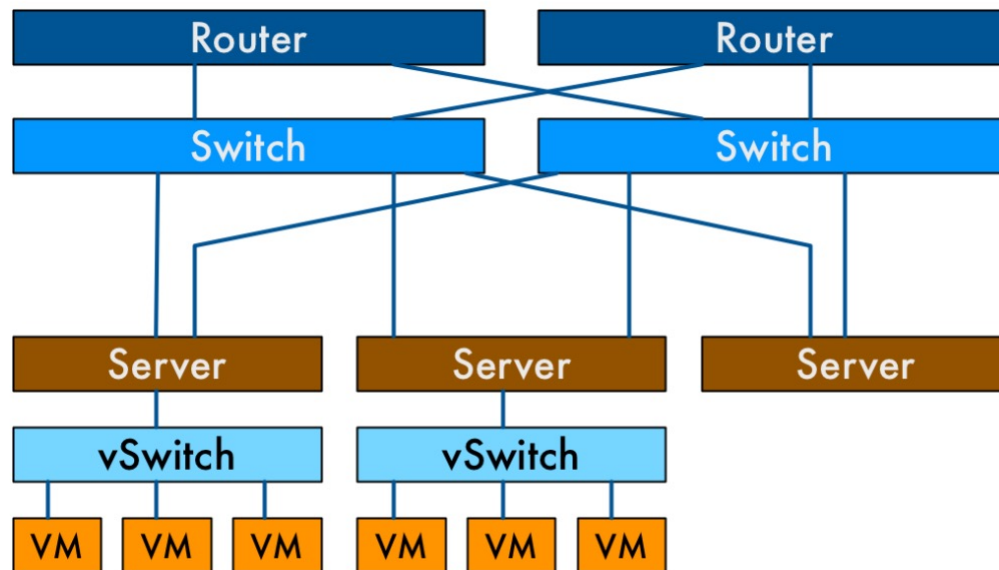
Networking Skills

- Spanning-Tree
- Routing Protocols
- QoS
- VPN Design
- Spanning-Tree
- VOIP
- Fibre Channel
- Security Policy
- MPLS
- Spanning-Tree
- Did I mention Spanning-Tree?

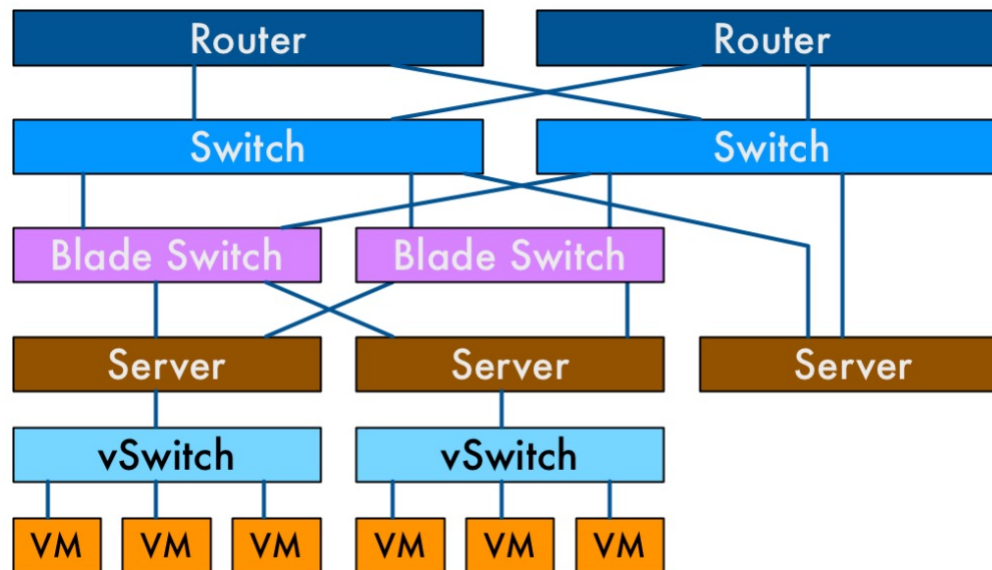
The Network...



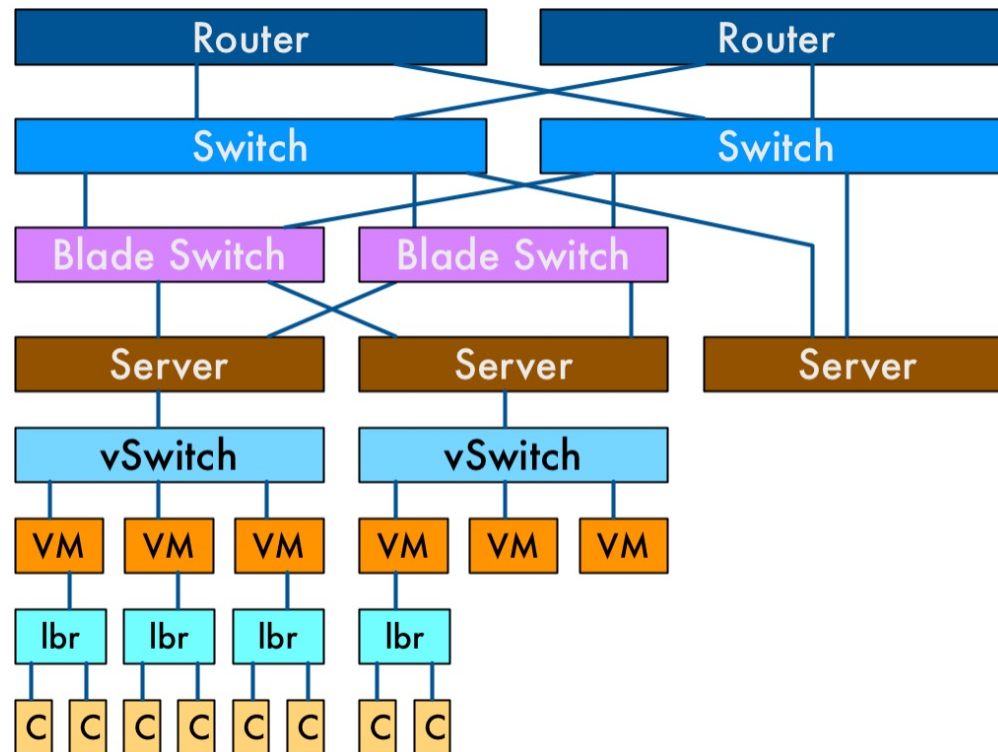
The Network...



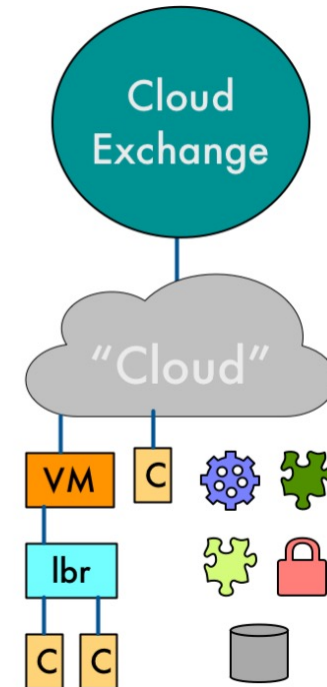
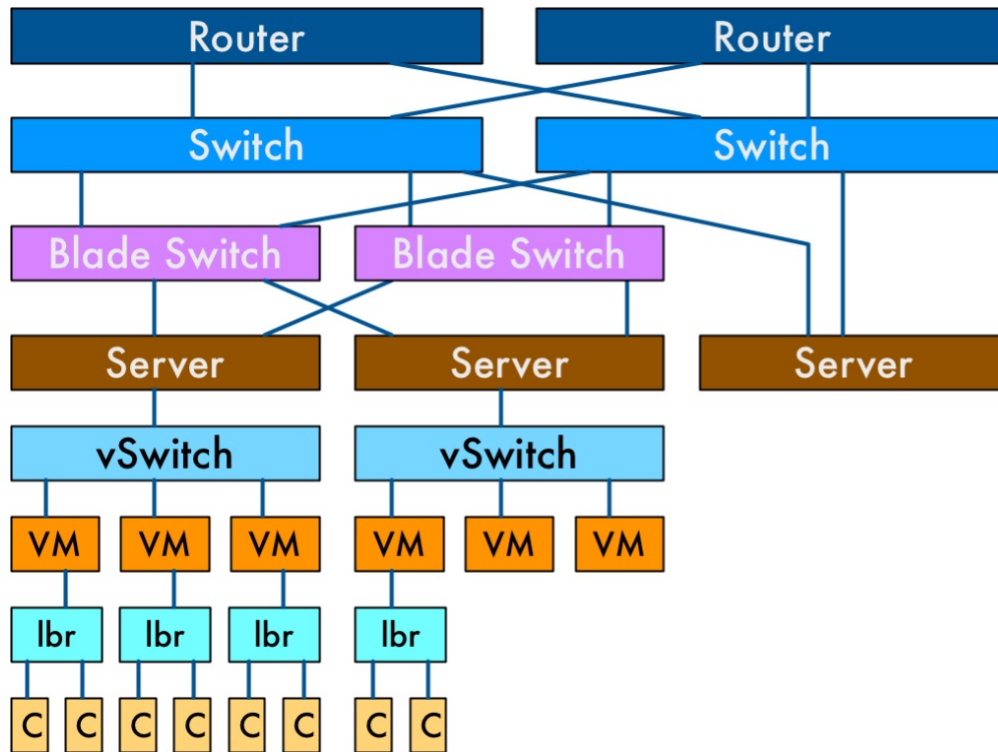
The Network...



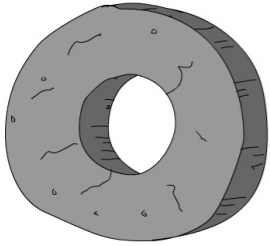
The Network...



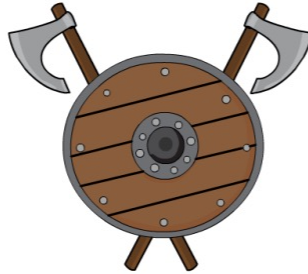
The Network...



NETWORKING THROUGH THE AGES...



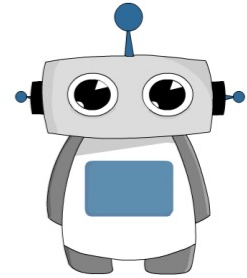
Stone Age
Spanning Tree
VLANs



Bronze Age
Routing Protocols
WAN Design
IP-magedon



The Renaissance
SDN
OpenFlow
Controllers
Overlays
MP-BGP
VXLAN
Micro-Segmentation
White Box



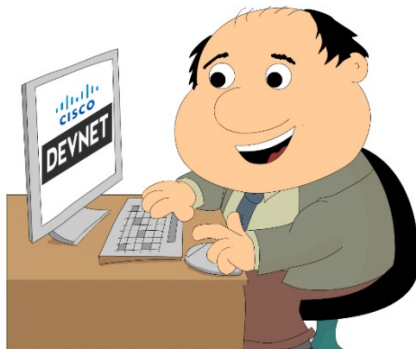
Programmable Age
Cloud
Python
REST / APIs
NETCONF / YANG
“Fabrics”
Network Function
Virtualization (NFV)
DevOps
Containers

The Four Ages of Networking.....

Carl's 3 Step Approach to Network Programmability

Phase 1

- Python
- REST APIs
- JSON/XML
- git/GitHub



Phase 2

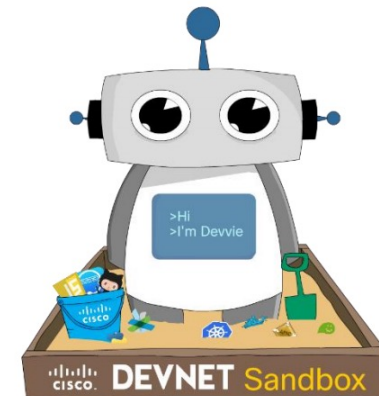
- Linux Skills
- Ansible
- Docker
- NETCONF/YANG

As Needed

- Network Controllers
- IOT Networking
- Cloud Networking
- NFV
- "DevOps"

Phase 3

- Linux Networking
- Container Networking
- NFV



Carl is now Captain Cloud!

Core Programming

- Python
- REST APIs
- JSON/XML
- Linux Skills
- Ansible
(Puppet/Chef/etc)
- git/GitHub
- Docker
- "DevOps"



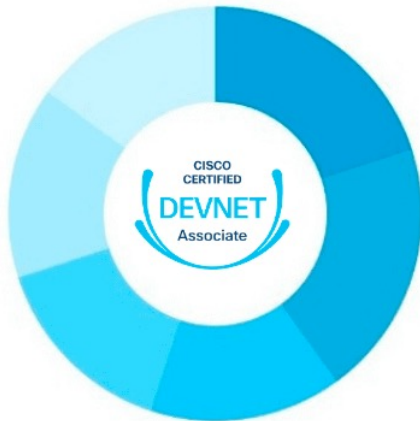
"New" Networking Stuff

- Network Controllers
- NETCONF/YANG
- Container Networking
- Cloud Networking
- Linux Networking
- IOT Networking
- NFV

CISCO DEVNET OVERVIEW

Cisco DevNet Associate Knowledge Domains

KNOWLEDGE DOMAINS



- 20% Understanding and Using APIs
- 20% Infrastructure and Automation
- 15% Application Deployment and Security
- 15% Cisco Platforms and Development
- 15% Network Fundamentals
- 15% Software Development and Design

Networking on DevNet

<https://developer.cisco.com/site/networking/>

Networking Dev Center

Learn how you can integrate with the network through full system management solutions in the cloud, utilize automation platforms and controllers, or directly interact with devices with APIs and Interfaces. Select a use case below to get started!

Getting started

- Learn to Program Networks
- Explore Cisco DNA
- Check out the demos

I'm looking for information about...

- Automate with Python
- Device Level APIs
- Day 0 Provisioning
- Host Applications on Devices
- Network Controllers
- Network User Visibility

Device Level APIs

Looking for details on the APIs and data models supported by Cisco's different network platforms?

Standard Device Interfaces

Cisco is committed to supporting industry standard data models as defined by YANG and RESTCONF and RESTCONF and gRPC access of platforms. Full details on learning, using, and getting data will follow support links can be found on the Standard Device Interfaces page.

[Learn more](#)

Cisco Specific APIs

Some devices may have reference to proprietary APIs for all users.

- ✓ Open API
- ✓ Open API
- ✓ API for Automation Policy Infrastructure Controller (APIC)
- ✓ Meraki API

Network Controllers

Network controllers provide management for network devices. They can be used to manage a large number of devices, or to manage a small number of devices in a specific way.

APIC-EM

APIC-EM is a cloud-managed network controller that provides a unified view of the network and enables you to manage the network in a more efficient way.

[Learn more](#)

ACI-EM

ACI-EM is a cloud-managed network controller that provides a unified view of the network and enables you to manage the network in a more efficient way.

[Learn more](#)

OpenDaylight

OpenDaylight is a cloud-managed network controller that provides a unified view of the network and enables you to manage the network in a more efficient way.

[Learn more](#)

Meraki

Meraki is a cloud-managed network controller that provides a unified view of the network and enables you to manage the network in a more efficient way.

[Learn more](#)

Networking

[Go to the Dev Center](#)

Digital Network Architecture

- DNA Software Capabilities
- DNA Demos
- Network Plug and Play
- Software Defined Access

Cloud Service Management

- CMX Mobility Services
- Meraki

Automation and Analytics

- Python Network Automation
- Apple iOS
- ACI (APIC Data Center)
- APIC Enterprise Module (APIC-EM)
- Network Services Orchestrator (NSO)
- WAN Automation Engine (WAE)
- Prime Infrastructure
- PNDA

Physical and Virtual Network Elements

- Standard Device Interfaces (YANG, NETCONF, RESTCONF)
- IOS XE
- NX-OS
- IOS-XR
- Network Function Virtualization (NFV)
- KVM Service Containers
- UCS E-Series
- 3rd Party Network Element
- Programmability (ConfD)

Open Source

- Open Daylight
- OPNFV

Hardware Specifications

- USGMI and USXGMI

Tools

- Virtual Internet Routing Lab (VIRL)
- NetX UI Toolkit
- YANG Development Kit (YDK)
- TRex

Community of Interest

- DNA
- Meraki

DevNet is “the” resource for engineers looking to get started with network programmability

DevNet Learning Labs Anytime, Anywhere!



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

Intro to Coding Fundamentals
Get started with coding basics by learning the fundamentals of coding with Python and parsing JSON.
0.5 hours

- Python Primer Level 1: Learn the basics of Python syntax, operators and conditional statements.
- Python Primer Level 2: Learn the basics of Python loops and functions.
- Parsing JSON with Python: Learn the basics of using and parsing JSON with Python.

Programming Foundation
Learn the foundational anatomy of programming.
0.5 hours

- Getting REST API Basics: Learn the basics of how to use REST APIs. Use POSTMAN to test making REST API calls using the APIC-EM APIs.
- Getting REST API Basics from Python: Learn the basics of how to call and consume a REST API in Python.

Cloud Native Development
Learn how virtual is to go from concept to production using the tools you know.
0.5 hours

- Container 101: The "Hello World" of containers, explained.
- Docker 101: Use docker to build and deploy your first container image.
- Microservices Overview: Learn about microservices, containers, and cloud native applications.

Introduction to Device Level Interfaces (ex: NETCONF/YANG)
Understand how driven programmability and how NETCONF, YANG, and RESTCONF fit into the next generation of standard device-level interfaces.
0.5 hours

- Introduction to Standard Device Interfaces: **Completed**
Understanding how NETCONF/YANG fits into the Network Management technologies.
- Introduction to YANG Data Modeling: **In Progress**
Understand what a Data Model is and what YANG enables for Network Management.
- Introduction to the NETCONF Protocol: **In Progress**
Explore the key elements of the NETCONF Protocol and how to use it.
- Introduction to the RESTCONF Protocol: **In Progress**
Explore the key elements of the RESTCONF Protocol and how to use it.

Network Controllers
Learn about developing with network controllers like APIC-EM.
0.5 hours

- APIC-EM APIs with Python: Part 1 - The Basics: The purpose of this learning lab is to understand the basics of the APIC-EM RESTCONF API. APIC-EM allows you to develop your own custom controller or add dynamic REST functionality already in your own applications.
- APIC-EM APIs with Python: Part 2 - Path Tracer: Learn about the APIC-EM Path Tracer API and REST Parameters using Python.
- APIC-EM APIs with Python: Part 3 - Policy Labs: Learn about how to use the APIC-EM Policy based API.

Getting Started With Meraki
Learn the basics of working with Meraki's cloud-managed API and then dive deeper into Meraki integration by building your own web helper.
0.5 hours

- Meraki Dashboard API: Get started with the Meraki Dashboard API.
- Meraki Build Your Own Web Helper: The purpose of this learning lab is to build a web helper with authentication.
- Meraki Location Scanning API: Config and launch a web app that leverages the Meraki Location Scanning API.

Introduction to ACI Programmability
This module introduces you to programmability options with the Cisco ACI SDN solution and provides hands-on with ACI REST and RESTCONF, two of the simplest ways to begin programming ACI.
0.5 hours

- Understanding ACI: **In Progress**
Learn the basics of the ACI controller and interfaces, and how basic commands using the GUI.
- ACI Programmability Overview: **In Progress**
Learn the basics of the ACI controller and interfaces, and how basic commands using the GUI.
- ACI Tools: **In Progress**
Introduction to the ACI Tools, a set of Python utilities for interacting with the ACI.
- Creating ACI Scripts the Easy Way - Webhooks: **In Progress**
Leverage the API to create basic Python scripts to program the ACI.
- How to ACI Programmability: Meraki Cloud a Tenant and Application Profile: **Completed**
You can use to create ACI Network Policies programmability.

Intermediate ACI Programmability
Continue exploring ACI programmability with a look at more APIs, SDKs and features!
0.5 hours

- Getting back to the ACI API: **In Progress**
Investigate the ACI REST API and the tools available to easily use it.
- ACI Webhooks: **In Progress**
Create a simple Python script for managing ACI using the Cisco SDK.
- ACI Webhooks: **In Progress**
Learn how to use your applications to ACI with Webhooks.
- Meraki: Use Cisco to build an Application Health Dashboard: **Completed**
You can use Cisco to build an Application Health Dashboard using Cisco.
- Meraki: Use Webhooks to Send Notifications to Slack: **Completed**
Get notification notifications to changes in your ACI network to Slack.

Open NXOS
With ACI's comprehensive SDN solution, Cisco offers infrastructure developers many options for programmability: managing their data center network with Open SDN. In this module we'll explore the capabilities available in Nexus switches operating in standalone mode.
0.5 hours

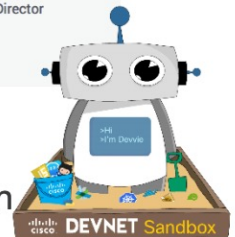
- Nexus OS Programmability and Automation Overview: Learn about NXOS programmability and automation capabilities.
- Introduction to On-Box Programmability in NXOS: Prepare your computer before you work through the lab steps for this learning track. Whether you attend a hosted event or work through the lab by yourself, you need to prepare your machine.
- Using NXOS REST: Learn about NXOS REST and how to interact with it using different methods.
- Cisco NX-OS Developer Sandbox and Vagrant: Learn how to configure Cisco Nexus Switch using NX-OS Developer Sandbox and how to make REST API calls using Vagrant.
- Meraki: Troubleshooting Using Cisco's MAC Address: Complete the exercise for full-OS module.

* New Labs and Modules Always in Development, check back often

<https://developer.cisco.com/site/sandbox/>

<p>Version 1.3.1</p> <p>APIC-EM Database Only</p> <p>APIC-EM__GA_DB-Only_AI... NEW - GA 1.3.1 Release</p> <p>ALWAYS-ON</p>	<p>Version 1.3.1</p> <p>APIC-EM Full HW Lab</p> <p>APIC-EM-FULL-HW NEW - GA 1.3.1 Release</p> <p>RESERVE</p>	<p>CMX Cloud</p> <p>CMX Cloud Immediate access the Cisco Connected Mobile Experience Cloud</p> <p>ALWAYS-ON</p>	<p>Meraki</p> <p>Meraki Always On</p> <p>ALWAYS-ON</p>	<p>Version 16.5</p> <p>NETCONF/YANG and RESTCONF On IOS-XE</p> <p>NETCONF-YANG and RES... Get hands on with Model Driven Programmability using</p> <p>RESERVE</p>	<p>Version 1.90</p> <p>TREx Load Generator</p> <p>TREx Explore Network Traffic Generation with TREx and a CSR1000v</p> <p>RESERVE</p>
<p>Version 2.2(1n)</p> <p>ACI Hardware Lab</p> <p>ACI Hardware Reservation APIC HW ver 2.2(1n) & n9000- 12.2(1n)</p> <p>RESERVE</p>	<p>Version 2.0.1</p> <p>ACI Simulator</p> <p>ACI Simulator AlwaysOn APIC Simulator Version 2.2(2e)</p> <p>ALWAYS-ON</p>	<p>Version 7.0(3)15(1)</p> <p>Open NX-OS w/ Nexus 9K</p> <p>Open NX-OS with Nexus 9K New Standalone Only Open NX-OS Lab with virtual switch version</p> <p>RESERVE</p>	<p>Version 1.0.0</p> <p>Contiv & Kubernetes</p> <p>Contiv and Kubernetes Contiv with your own Kubernetes 1.5.4 cluster!</p> <p>RESERVE</p>	<p>OpenPlatform NFV CentOS</p> <p>OpenPlatformNFV-CentOS CentOS 7 OPNFV Brahmaputra Release</p> <p>RESERVE</p>	<p>Version 1.3</p> <p>IOx</p> <p>IOx v1.3 IOx-CAF x2 + Fog Director</p> <p>RESERVE</p>

* New Sandboxes always in Development, check back often



Devnet course overview (1)



MODULE 1: SOFTWARE DEVELOPMENT AND DESIGN

- Describing Software Development Process
- Linux BASH
- Software Version Control

MODULE 2: PYTHON FUNDAMENTALS FOR DEVASC (1)

- Getting Started with Python
- Understanding Python Syntax
- Data Types and Variables
- Flow Control with Conditionals and Loops
- Python Functions
- Working with Python Modules
- File Input and Output

MODULE 3: UNDERSTANDING AND USING APIs

- Application Programming Interfaces (APIs)
- REST Tools
- Introducing Cisco Platforms and APIs

MODULE 4: APPLICATION DEPLOYMENT

- Application Deployment Models
- DevOps
- Docker

MODULE 5: INFRASTRUCTURE AND AUTOMATION

- Infrastructure Automation
- Model-Driven Programmability