



hackone

Devnet Associate

Devasc 200-901



Module 1: Course Introduction

Instructors:

Josinfo
João Otavio

DevNet Associates v1.0



1.1: About Devnet

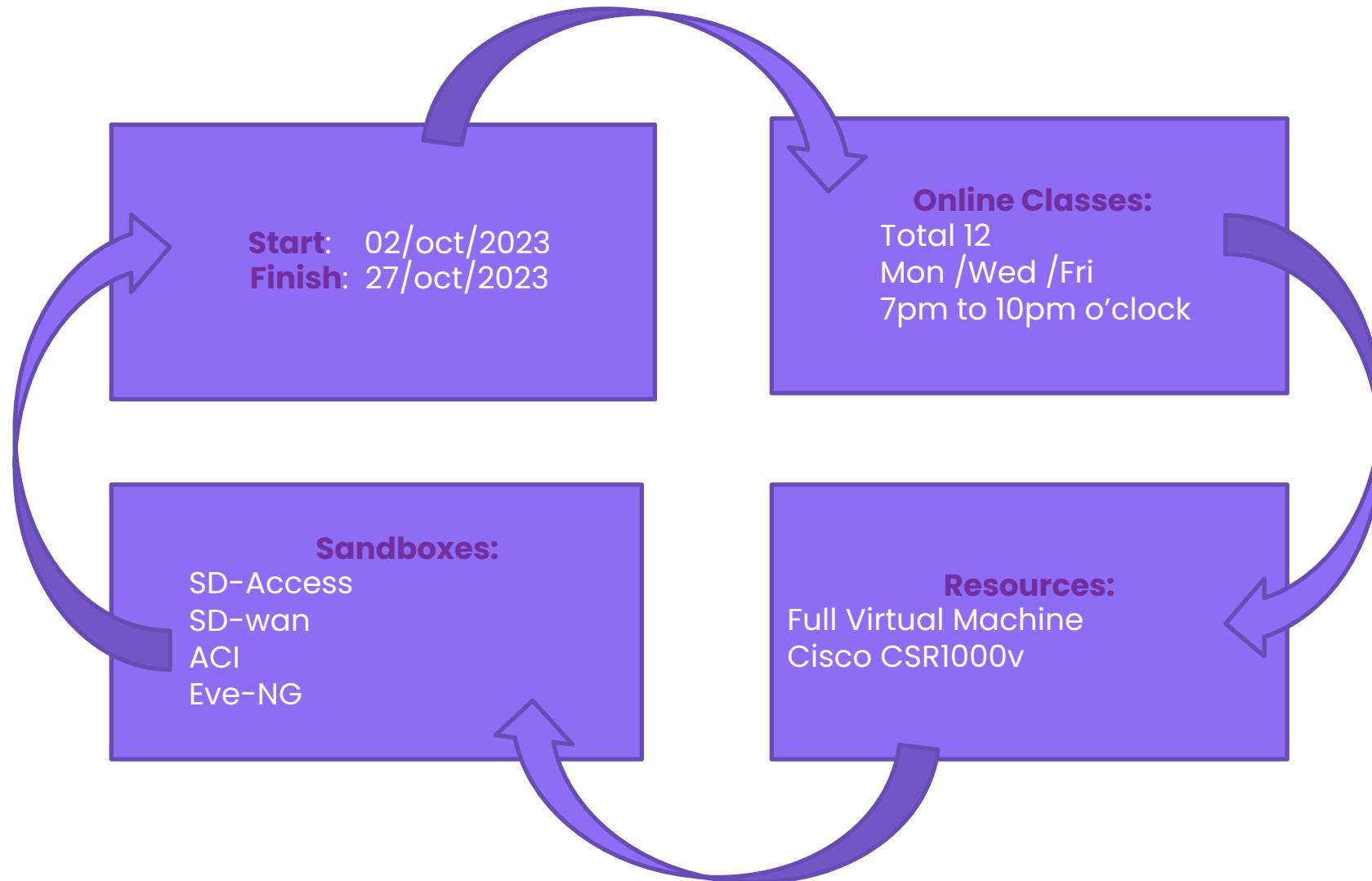
1.2: Instructors / Students

1.3: Calendar

1.4: Content Program

1.5: Exploring DevNet Online Resources







CLASS	DATE	DAY	MODULE	TOPIC	INSTRUCTOR
01	02/oct/2023	2a	1	The DevNet Developer Environment	Josinfo
02	04/oct/2023	4a	2	Pyhton	Josinfo
03	06/oct/2023	6a	3	Software Development and Design	João Otavio
04	09/oct/2023	2a	4	Understanding and Using APIs	João Otavio
05	11/oct/2023	4a	5	Network Enterprise Fundamentals	Josinfo
06	13/oct/2023	6a	5	Network DataCenter Fundamentals	Josinfo
07	16/oct/2023	2a	6	Application Deployment	João Otavio
08	18/oct/2023	4a	6	Application Deployment	João Otavio
09	20/oct/2023	6a	5	Cisco DNA Fabric In a Box Lab	Josinfo
10	23/oct/2023	2a	7	Cisco Platforms and Development	João Otavio
11	25/oct/2023	4a	8	Cisco Platforms and Development	João Otavio
12	27/oct/2023	6a	8	Infrastructure and Lab	Josinfo





**Josimar Caitano
(Josinfo)**

<https://www.linkedin.com/in/josinfo/>



João Otavio

<https://www.linkedin.com/in/jotaviorc/>





	Module Title	Objectives
1	Course Introduction	<ul style="list-style-type: none">• Setup the lab environment• Review Python programming and Linux skills
2	The DevNet Developer Environment	<ul style="list-style-type: none">• Explore and get familiar with DevNet Resources
3	Software Development and Design	<ul style="list-style-type: none">• Use best practices from software development and design with Python
4	Understanding and Using APIs	<ul style="list-style-type: none">• Discover API Design and Architecture styles and Advanced uses of REST APIs• Interact with REST APIs using command line, graphical tools and Python code
5	Network Fundamentals	<ul style="list-style-type: none">• Explain the features and functions of common network devices• Troubleshoot basic network connectivity issues
6	Application Deployment and Security	<ul style="list-style-type: none">• Use current technologies to deploy and secure applications and data in a local or cloud environments
7	Infrastructure and Automation	<ul style="list-style-type: none">• Explore software testing and deployment methods in automation and simulation environments and use DevOps tools for infrastructure automation
8	Cisco Platforms and Development	<ul style="list-style-type: none">• Compare Cisco platforms used for collaboration, infrastructure management, and automation• Use APIs to interact with and automate Cisco platforms



Course Overview

This course introduces the methodologies and tools of modern software development, applied to the IT and Network operations. It covers a 360 view of the domain including microservices, testing, containers and DevOps, as well as securely automating infrastructures with Application Programming Interfaces (APIs).

Benefits

Gain practical, relevant, hands-on lab experience, including programming in Python, using GIT and common data formats (JSON, XML and YAML), deploying applications as containers, using Continuous Integration/Continuous Deployment (CI/CD) pipelines and automating infrastructure using code.

Prepare for Careers

- ✓ Develop skills for entry-level software development and infrastructure automation jobs
- ✓ Prepare for DevNet Associate certification exam

Course Details

Target Audience: Secondary vocational students, 2-year and 4-year college students and participants of coding bootcamps

Recommended Preparation:

Coding skills, equivalent to:

PCAP: Programming Essentials in Python

Fundamental skills of networking, equivalent to:

CCNA: Introduction to Networks

Learning Component Highlights:

- ✓ 8 Modules with 6 Videos, 23 Hands-on Labs and 5 Cisco Packet Tracer Activities
- ✓ 8 Quizzes, 8 Module Exam, Practice Final Exam, Final Exam, Skills Based Assessment
- ✓ Practice Exam for DEVASC Certification

Recommended Next Course:

CCNA, CCNP or CyberOps Associate



Certification Aligned
[Cisco Certified DevNet Associate](#)



Knowledge Domains

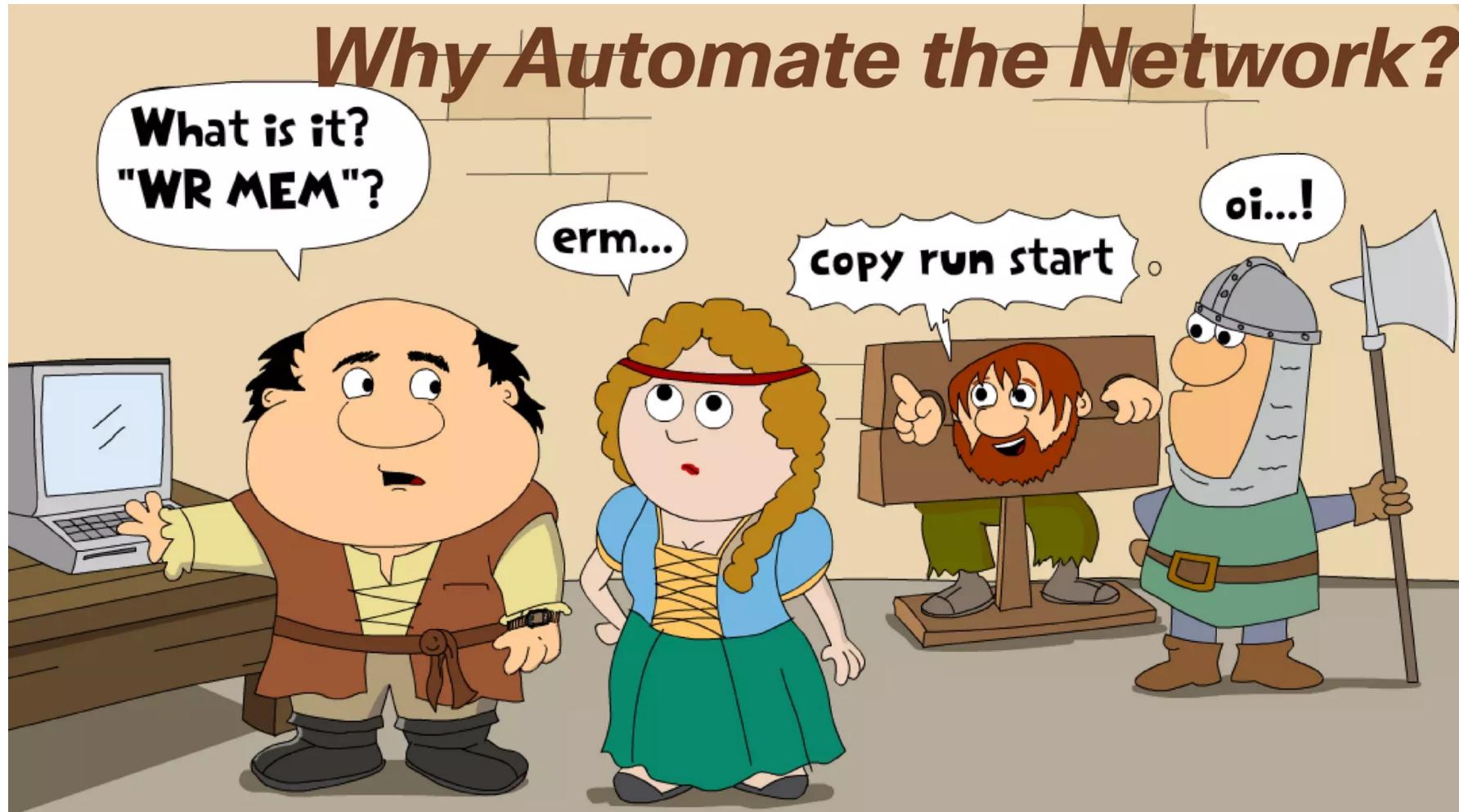
- Understanding and Securely Using APIs
- Software Development and Design
- Application Deployment and Security
- Infrastructure and Automation
- Network Fundamentals



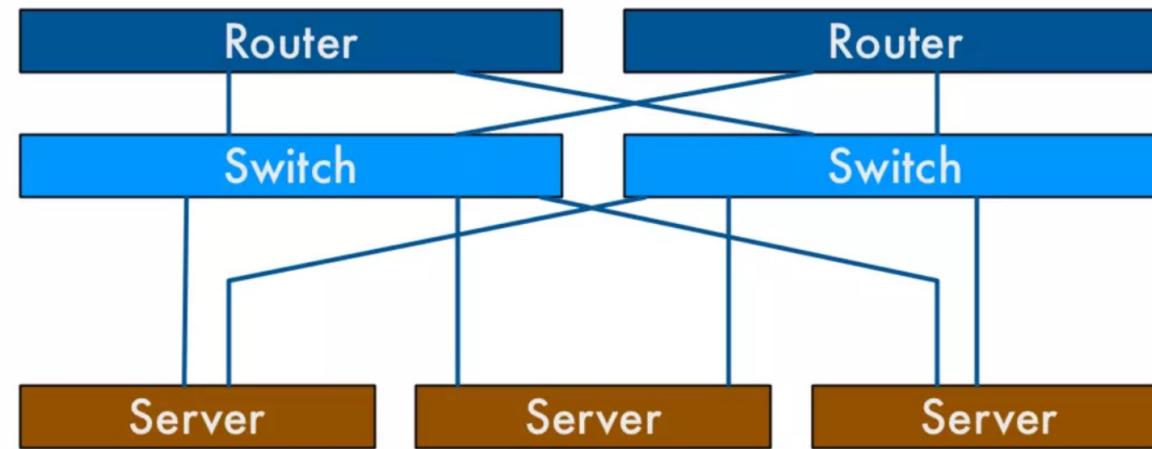


DevNet Associate 1.0 Course

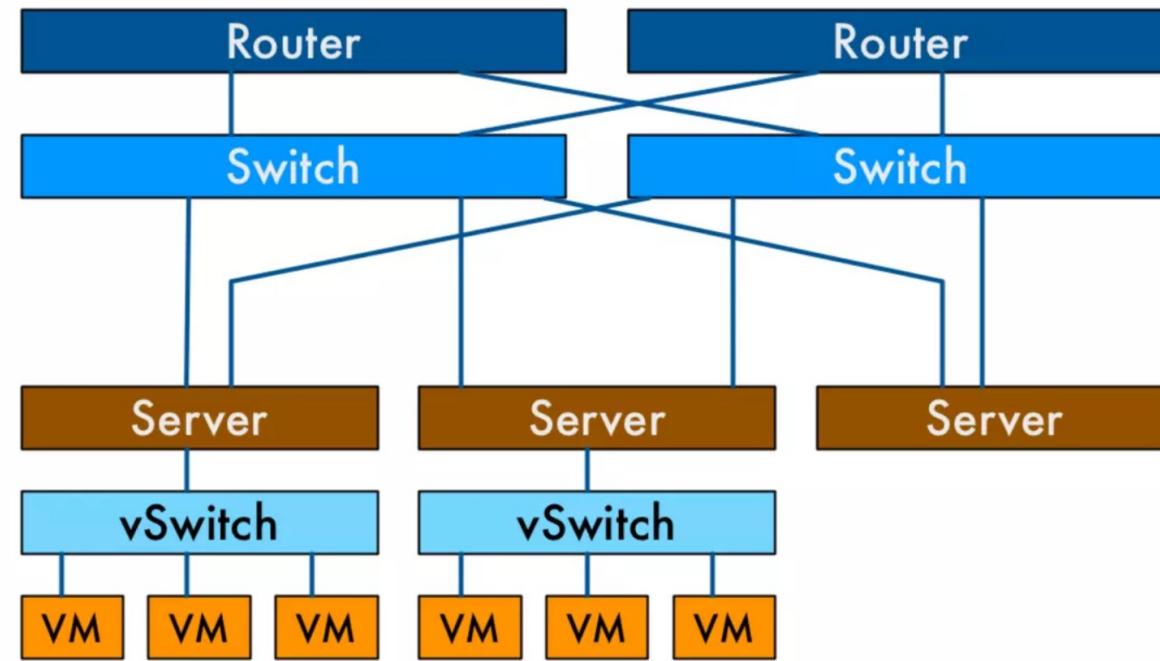




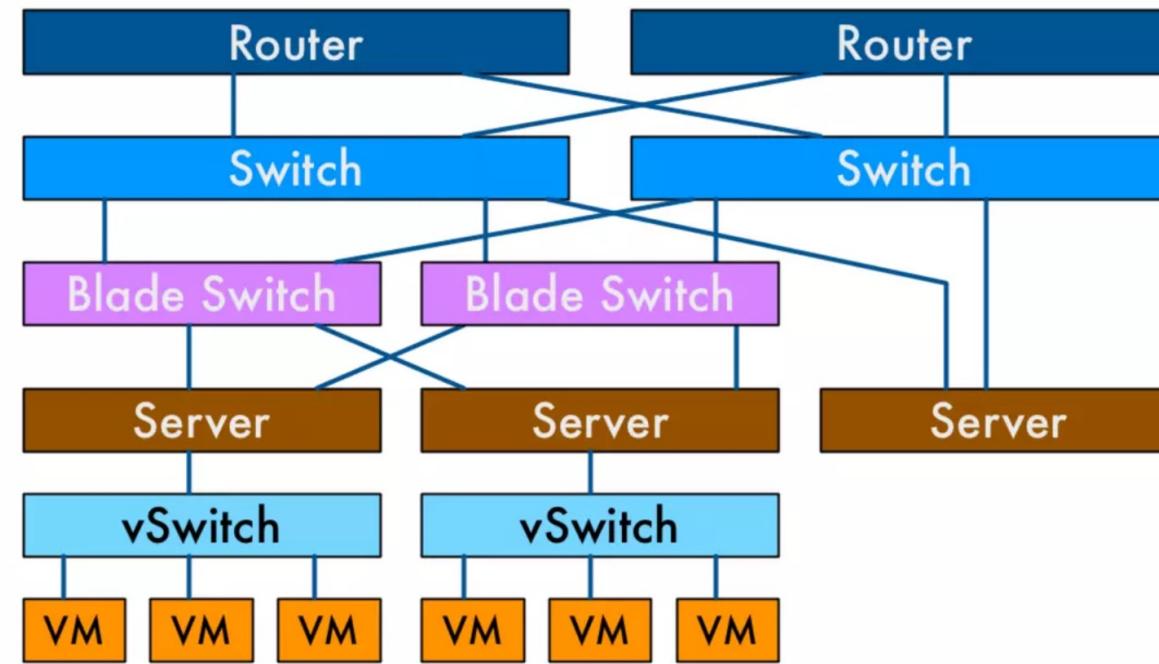
Evolution of Network ...



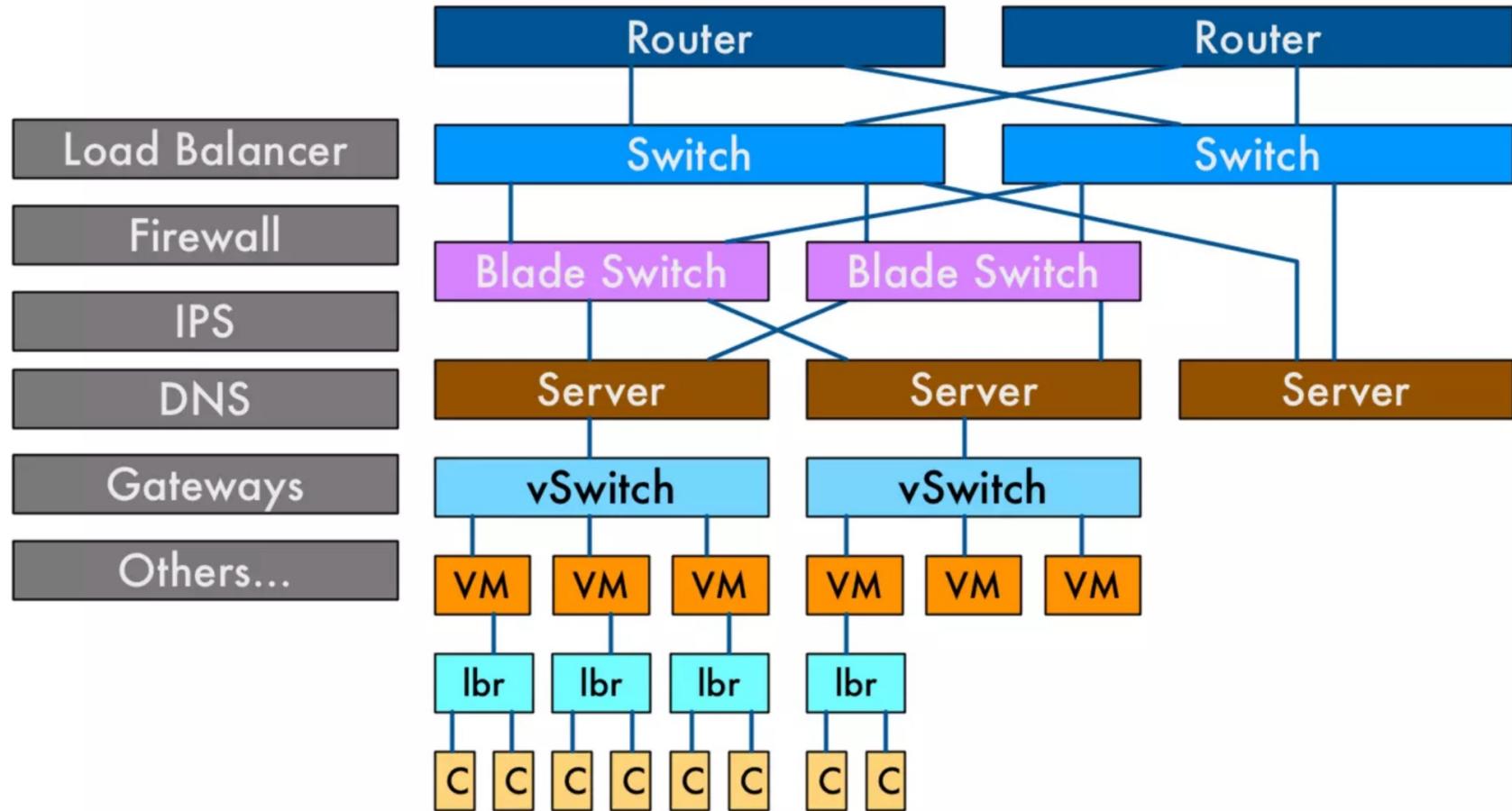
Evolution of Network ...



Evolution of Network ...

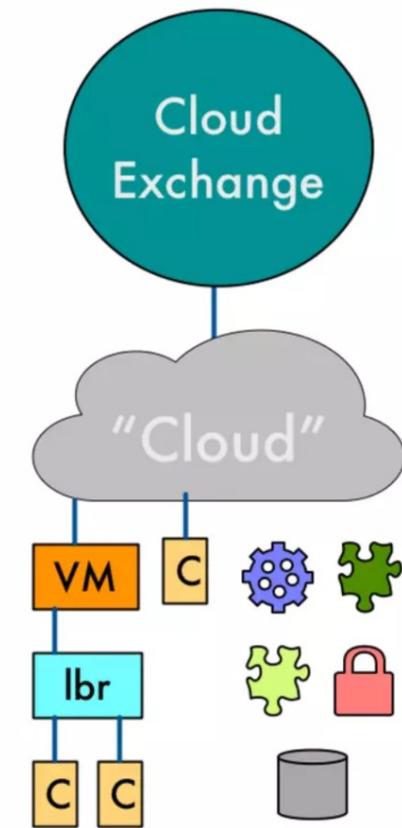
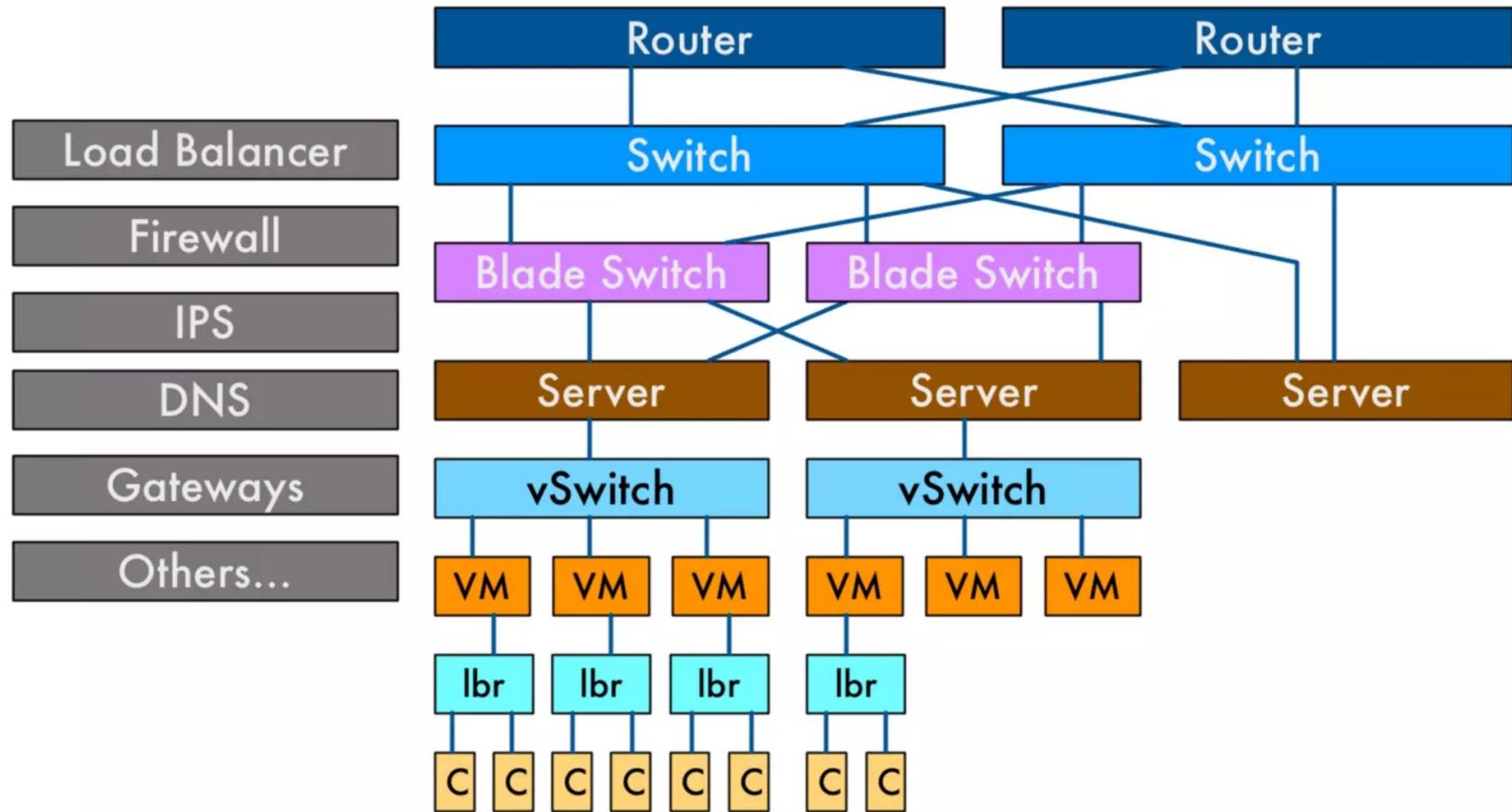


Evolution of Network ...





Evolution of Network ...





- Functional but considered fragile
- Network configuration more “art than science”
- Tribal knowledge of key engineers



“Every time we implement a network change something goes wrong...”

“Isn’t it great, our switch hasn’t been rebooted in 6 years”

“We can’t update/change the network, our business won’t allow it”

* Paraphrased quotes from actual network operators





```
show ver
Cisco Internetwork Operating System Software
IOS (tm) 3000 Software (IGS-J-L), Version 11.1(8), RELEASE SOFTWARE
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Thu 05-Dec-96 11:41 by tamb
Image text-base: 0x03038820, data-base: 0x00001000
```

```
ROM: System Bootstrap, Version 5.2(8a), RELEASE SOFTWARE
ROM: 3000 Bootstrap Software (IGS-RXBOOT), Version 10.2(8a), RE
```

```
orl-sn2 uptime is 20 years, 2 days, 21 hours, 21 minutes
System restarted by reload at 10:39:11 CST Wed Jan 29 1997
System image file is "flash:igs-j-1_111-8.bin", booted via flash
Network configuration file is "20010729155316-orl-sn2.cfg", bo
```

```
cisco 2500 (68030) processor (revision D) with 16384K/2048K byt
```

```
# show ver | i up|Hard|Ver
Cisco Adaptive Security Appliance Software Version 7.2(4)
Device Manager Version 5.2(4)
Config file at boot was "startup-config"
up 9 years 156 days
Hardware: ASA5505, 256 MB RAM, CPU Geode 500 MHz
```

```
Cisco Internetwork Operating System Software
IOS (tm) 2500 Software (C2500-D-L), Version 12.0(9), RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2000 by cisco Systems, Inc.
Compiled Mon 24-Jan-00 22:06 by bettyl
Image text-base: 0x03038700, data-base: 0x00001000
```

```
ROM: System Bootstrap, Version 11.0(10c), SOFTWARE
BOOTFLASH: 3000 Bootstrap Software (IGS-BOOT-R), Version 11.0(10c), RELEASE SOFT
```

```
uptime is 14 years, 1 week, 3 days, 15 hours, 51 minutes
System restarted by reload at 02:20:35 GMT Sat Oct 21 2000
Processor board ID 1000000000000000
```

```
Support: http://www.CISCO.COM/tac
Copyright (c) 1986-2002 by cisco Systems, Inc.
Compiled Sat 21-Dec-02 18:55 by ccai
Image text-base: 0x60008930, data-base: 0x61836000
```

```
ROM: System Bootstrap, Version 11.1(19)AA, EARLY DEPLOYMENT REL
```

```
uptime is 19 years, 3 days, 2 hours, 11 minutes
System returned to ROM by power-on
System restarted at 13:18:32 UTC Wed Mar 3 2004
System image file is "flash:c3640-is-mz.122-11.T3.bin"
```

```
CISCO 3640 (R4700) processor (revision 0x00) with 78848K/52224K
Processor board ID 1000000000000000
```



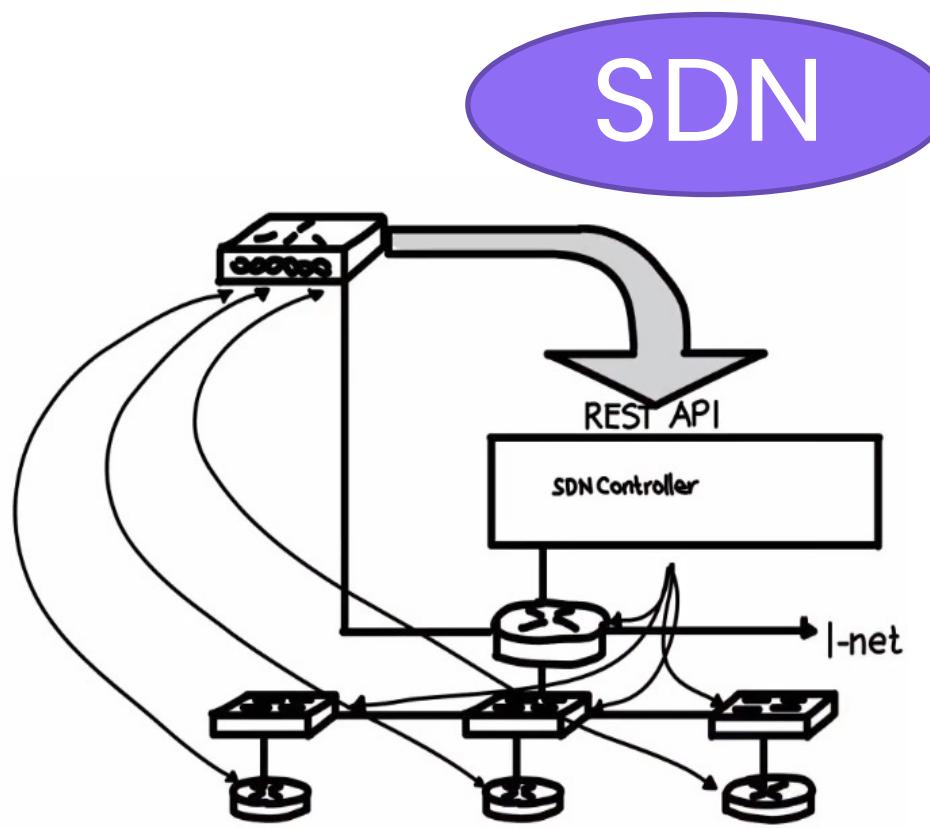


74% of operators report network changes have significantly impacted their business*

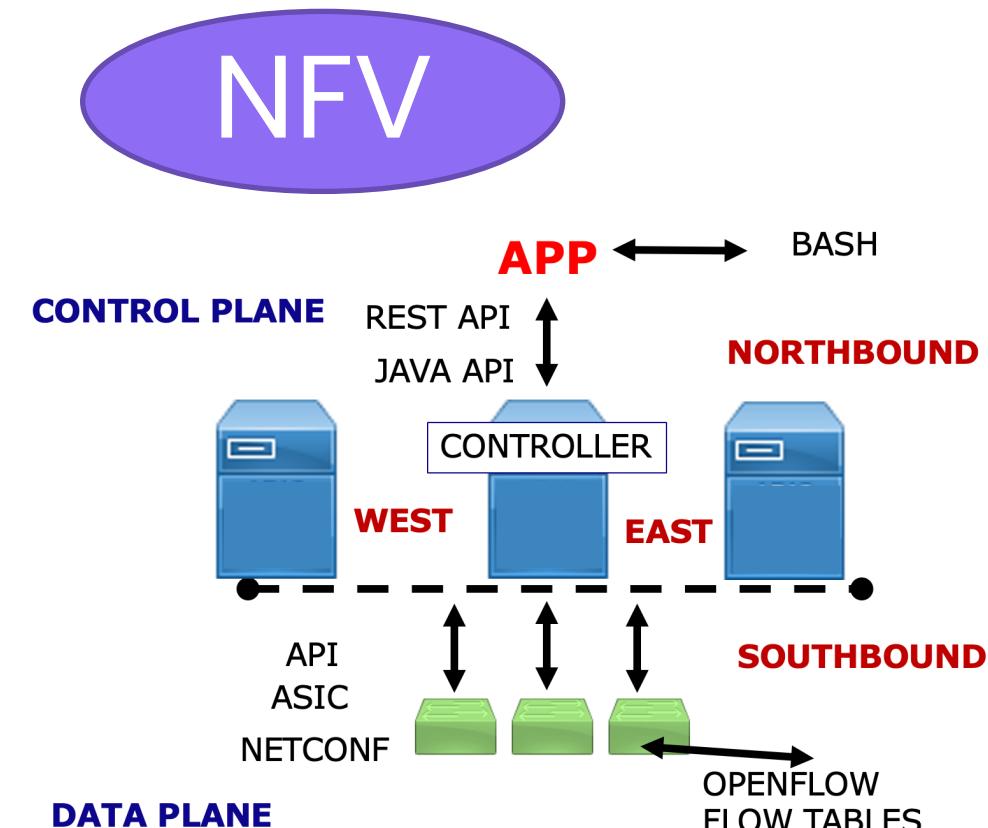
97% of operators admit human factors cause network outages*

22% of unplanned outages caused by human error**





OPEN NETWORKING
FOUNDATION



OpenFlow



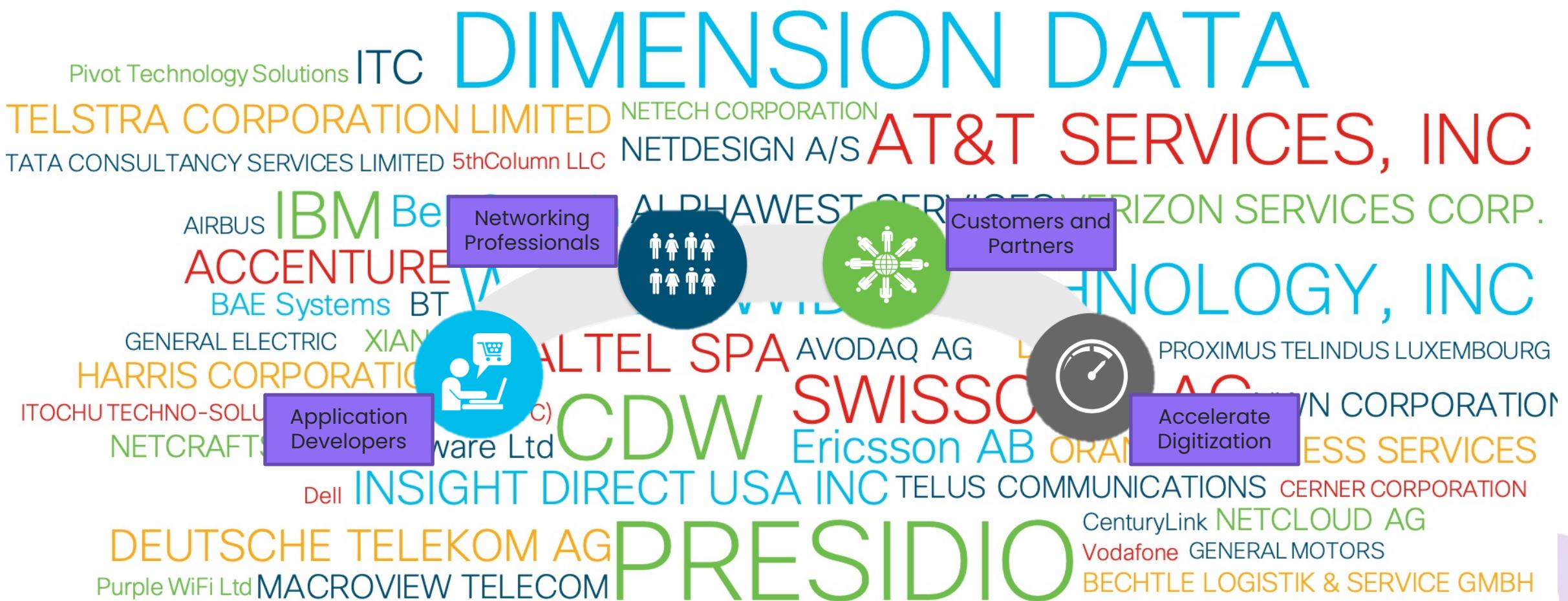
SDN

NFV



OPEN NETWORKING
FOUNDATION







Enabling end-to-end developer success

API Experience

network-device

GET	/network-device/config
GET	/network-device/config/count
GET	/network-device/{networkDeviceId}/config
GET	/network-device
POST	/network-device

Developer Sandbox

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- Security
- AI/ML
- Collaboration
- Analytics & Automation
- Open Source

Training and Tutorials

Network Device APIs

Network programmability is more than just APIs. Learn about the latest in programmability and how to use the module.

- 1 Getting the "YANG" of it with YANG
- 2 Goodbye SNMP <hello> NETCONF

Sample Code

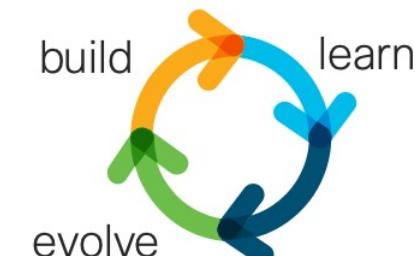


developer.cisco.com

Co-Creations



Developer Advocacy





Sandbox: Networking

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EXPLORE TECHNOLOGIES >

Networking Data Center Cloud Security

IoT Collaboration Analytics & Automation Open Source

Develop, code & configure in the Sandbox

LAB MANAGEMENT INVENTORY MANAGE

Version 1.5 APIC-EM HW Model 3 APIC-EM_GA_HW-MiniL... NEW - GA 1.5 Release RESERVE	Version 1.5 APIC-EM HW Model 4 APIC-EM_GA_HW-MiniL... NEW - GA 1.5 Release RESERVE	CMX Cloud Immediate access to the Cisco Connected Mobile Experience ALWAYS-ON	Version 10.4 CMX Location 10.4 Immediate access to the CMX 10.4 Location REST API ALWAYS-ON	Version 10.4 CMX Presence 10.4 Immediate Access - CMX Presence 10.4 Sandbox with REST API ALWAYS-ON
Version 1.1.3 Digital Network Architecture Center DNA Center Version 1.1.5 ALWAYS-ON	16.6.1 IOS XE on Catalyst 9000 RESERVE	Version 16.6 IOS XE Programmability with NETCONF/RESTCONF/YANG Check out Guest Shell, RESTCONF, NETCONF, YANG and more on IOS RESERVE	Meraki ALWAYS-ON	Version 1.0 Multi-IOS Cisco Test Network Multi Cisco network node topology using VRL RESERVE
Version 16.6 NETCONF/YANG and RESTCONF On IOS XE NETCONF-YANG and RES... Get hands on with Model Driven Programmability using ALWAYS-ON	Version 7.0(D970) Open NX-OS Programmability (Nx-AAA, NETCONF, RESTCONF, gRPC) Open NX-OS Programma... Explore the programmability features of Open NX-OS including ALWAYS-ON	Version 3.3 Prime Infrastructure Explore the Cisco Prime Infrastructure REST API v3.3 Prime Infrastructure Explore the Cisco Prime Infrastructure REST API v3.3 ALWAYS-ON		

[Back to top](#)



Sandbox: Learning Labs

The screenshot shows the Cisco DevNet Learning Labs interface. At the top, there's a navigation bar with links for Tracks, Modules, Labs, Challenges, Help, and Feedback, along with a welcome message for Thomas Davies and a notification bell.

Below the navigation bar, there are several learning tracks represented as cards:

- IOS XE Programmability**: A card with a teal header. Description: "Use this learning track to learn about all the programmability features available to you with IOS XE. Start by learning all about Network Configuration YANG Data Models with NETCONF and RESTCONF. Then learn how to use Utilities, Python code, or even host applications to interact with the network." It includes a "Network Programmability for Network Engineers" sub-card.
- Meraki**: A card with a teal header. Description: "Meraki has over 230,000+ customers and 3 million+ devices worldwide. Learn how Meraki makes it easy for developers to create apps that enable loyalty programs, build analytics extensions, and make it easier for businesses to manage their networks. Developers can do with Meraki integrations."
- Programming the Digital Network Architecture (DNA)**: A large central card with a teal header. Description: "Dive in and learn all you need to know to work with the APIs and interfaces in the Digital Network Architecture. Explore programming foundations and APIs. Learn about APIC-EM, APIC, and DNA Center."
- Network Programmability for Application Developers**: A card with a teal header. Description: "Learn about network programmability from the perspective of an Application Developer. Contains information about basic networking concepts in addition to interfaces like RESTCONF."
- Network Programmability for Network Engineers**: A sub-card under the IOS XE Programmability track with a teal header. Description: "Learn about network programmability from the perspective of a Network Engineer. Contains information about programming, REST APIs, as well as new interfaces like RESTCONF."

At the bottom of each card, there are metrics: number of modules, number of labs, and total hours.

Learning Track	Modules	Labs	Hours
IOS XE Programmability	3	11	4
Meraki			
Programming the Digital Network Architecture (DNA)			
Network Programmability for Application Developers	4	14	6
Network Programmability for Network Engineers			



Network as Code and Configuration Management strategies

- Continuous Development approach to network changes.
- Continuous health and improvement approach to monitoring.
- Deliver End User Self Service experience in “eStores”





Network Skills

- Spanning-Tree
- Routing Protocols
- QoS
- VPN Design
- VOIP
- Fibre Channel
- Security Policy
- MPLS
- etc

Programming Skills

- TCL
- EEM
- Expect Scripts



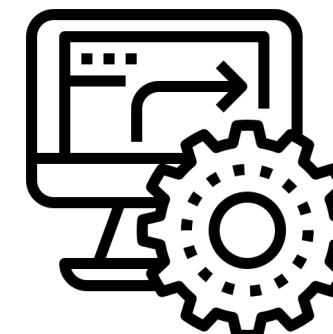


Network Skills

- Layer 2 & 3 Fundamentals
- Quality of Service
- Security and Segmentation
- Linux Networking
- Container Networking
- Cloud Networking
- IOT Networking
- Model Driven Programmability
- Network Function Virtualization

Platform Skills

- Linux Administration
- Container Fundamentals
- Micro Service Platforms
- Cloud Fundamentals Programming Skills
- Data Formats (ex: JSON/YAML)
- Python and APIs (ex: REST)
- Source Control (ex: git)
- Configuration Management (ex: Ansible)





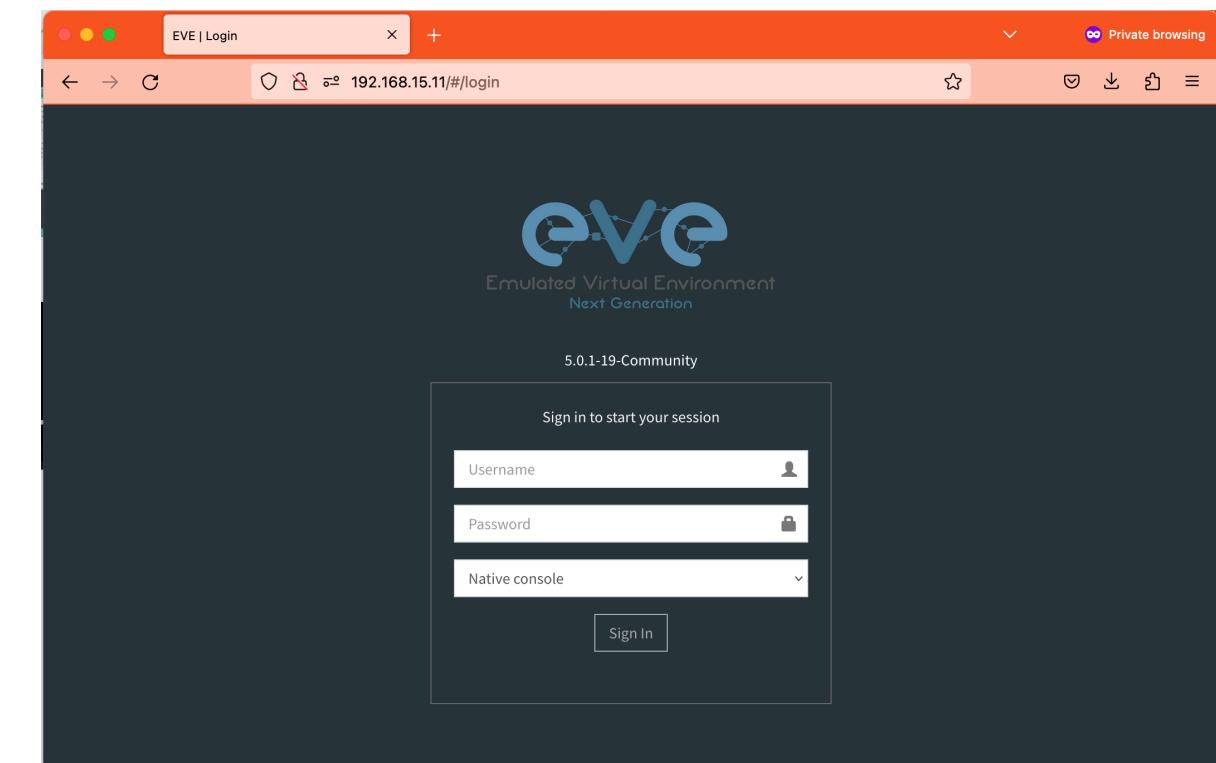
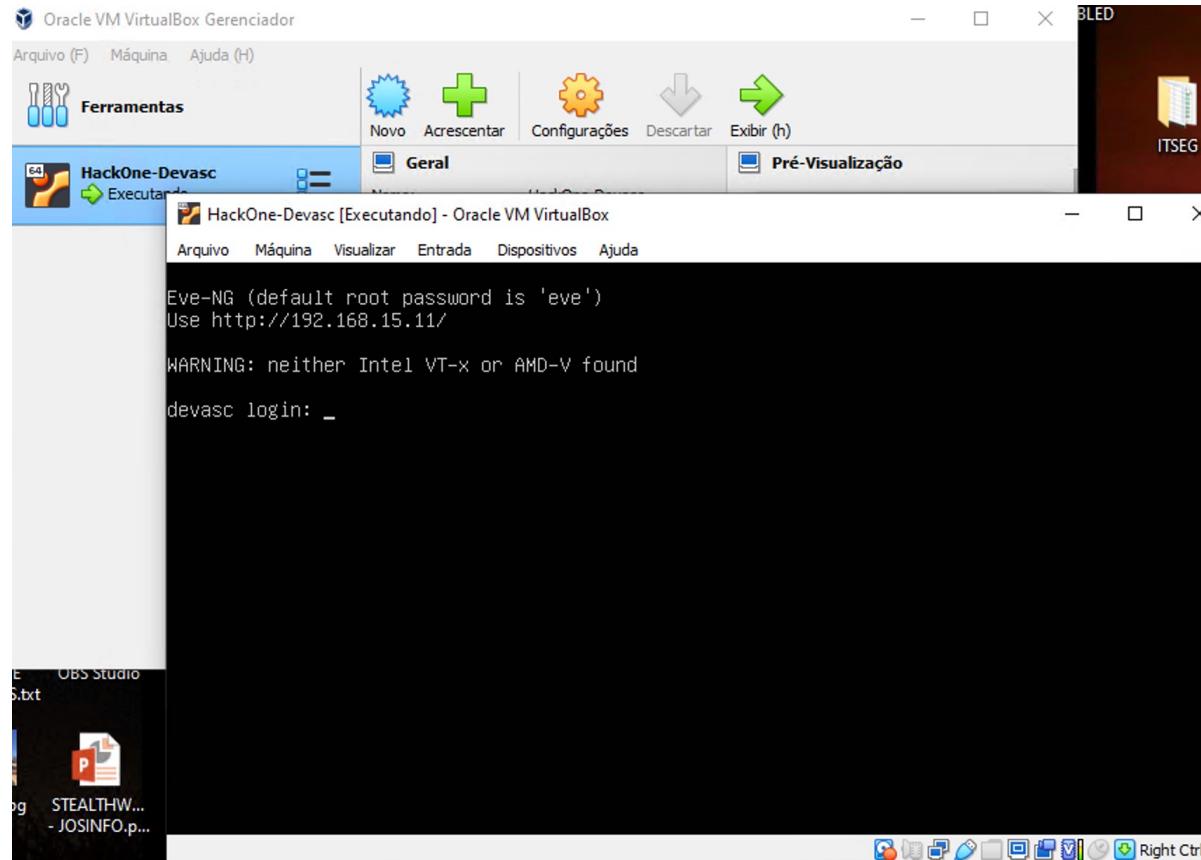
Lab Equipment





Virtual Machines

- Linux Lab VM
- Eve-NG

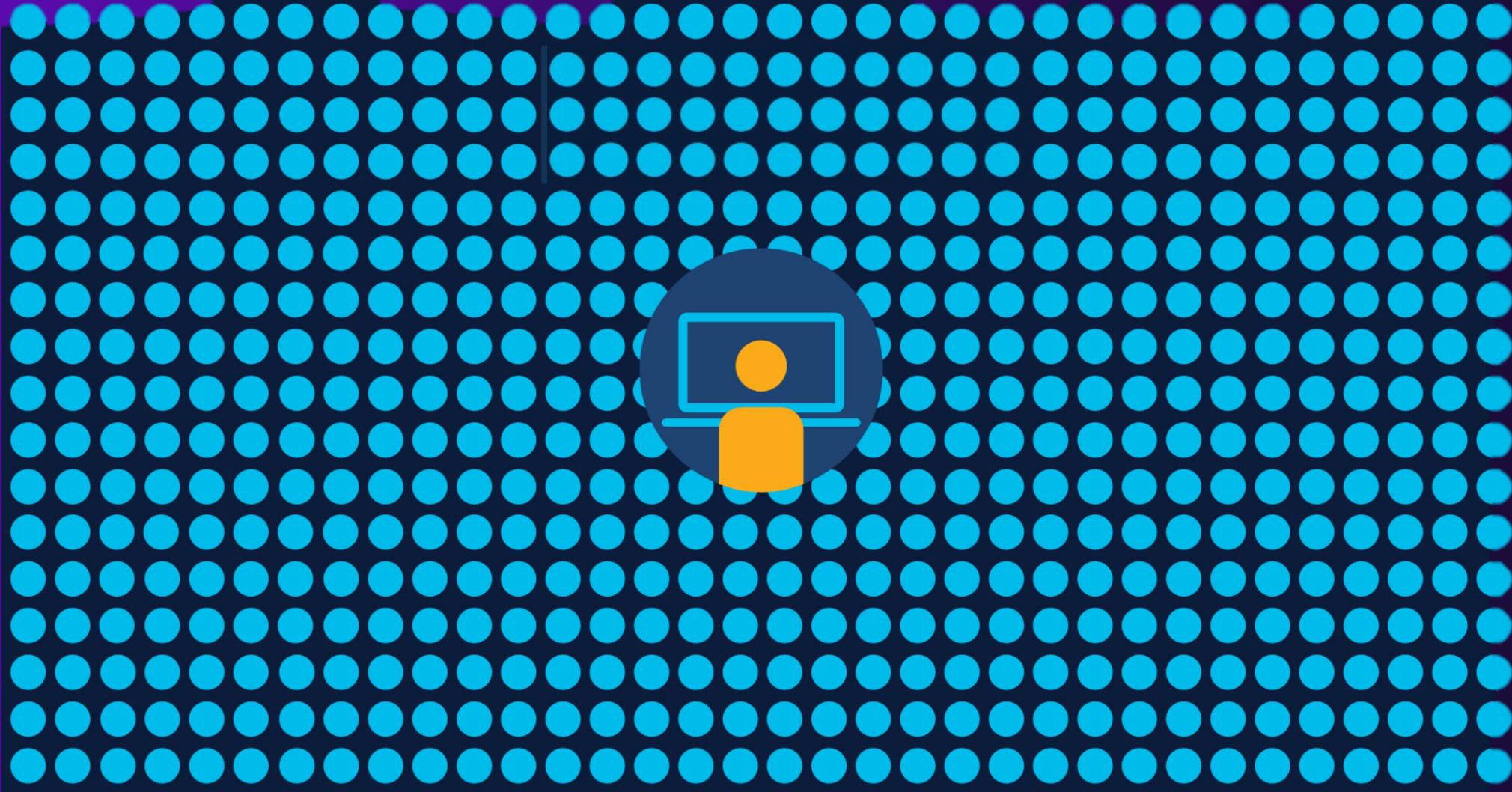


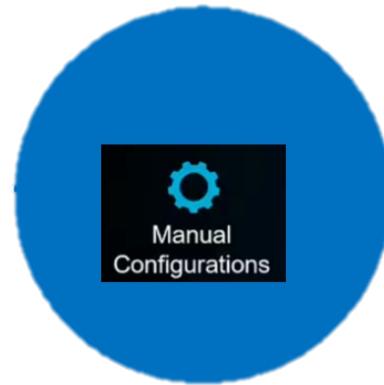


DevNet First Steps

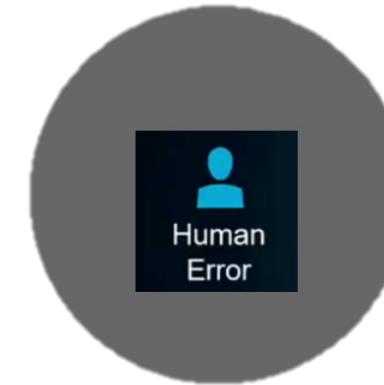








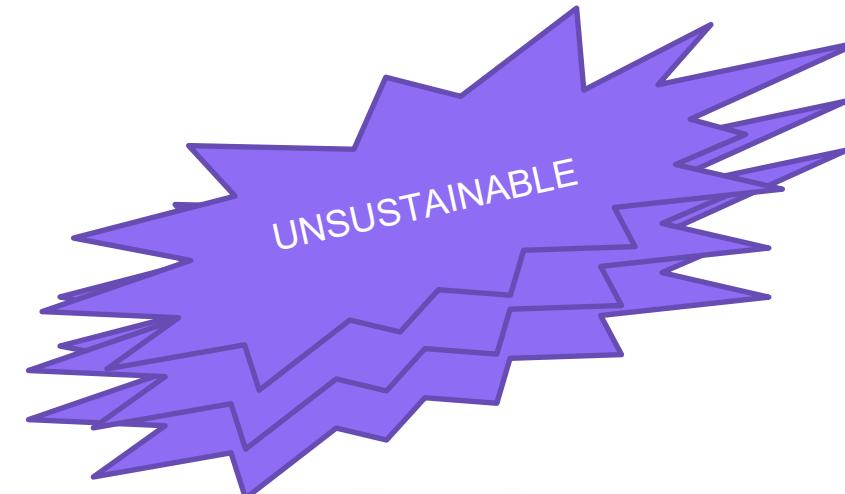
Changes to network configuration made manually

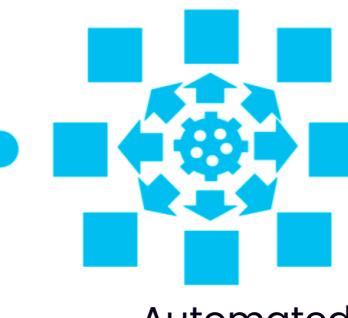
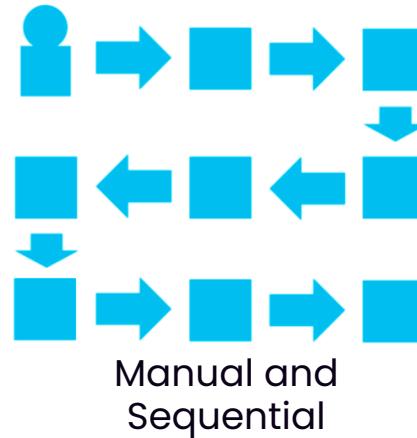


Human errors in configuration are common



High spending on tools and services to have network visibility and diagnostic tools



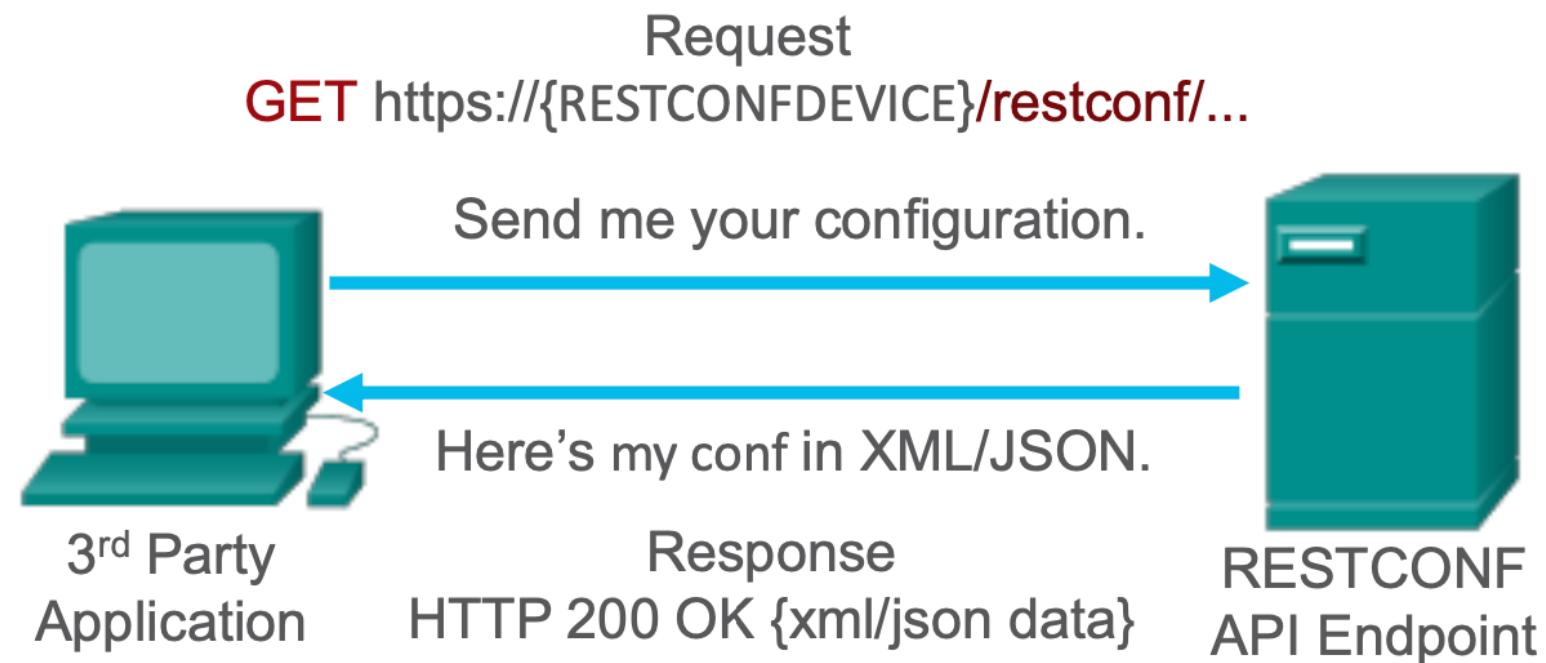




Application Program Interface

Basically, API are called based on Instructions that make two applications (resources) able to communicate between each other

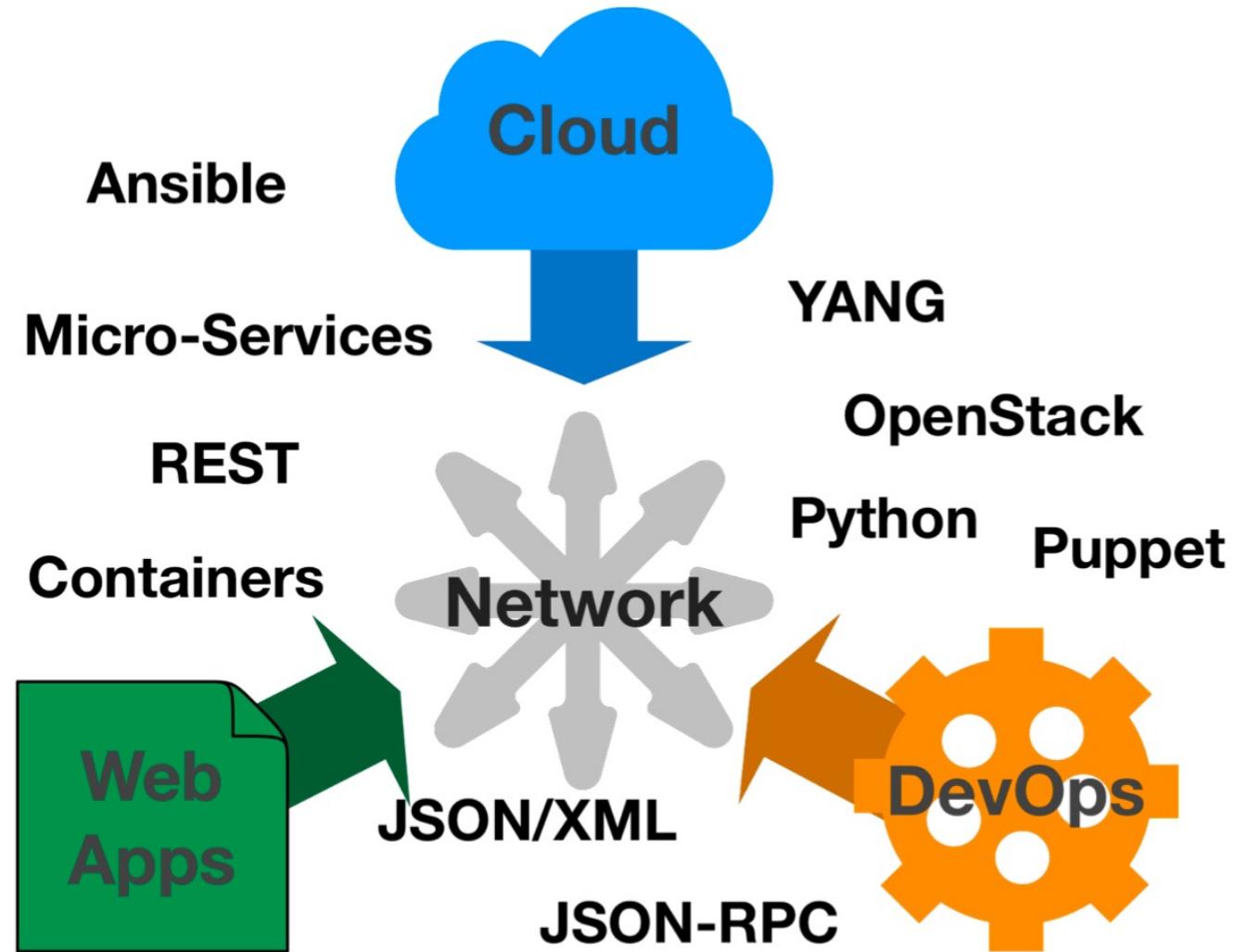




```
for switch in my_network:  
    for interface in switch:  
        if interface.is_down() and interface.last_change() > thirty_days:  
            interface.shutdown()  
            interface.set_description("Interface disabled per Policy")
```

Coding is the process of writing instructions, in a language a computer can understand, to complete a specific task.







Cisco Developer Documentation Learn Technologies Community Events

Search for

Documentation

Learn by doing efficient interactive tutorials with Cisco products

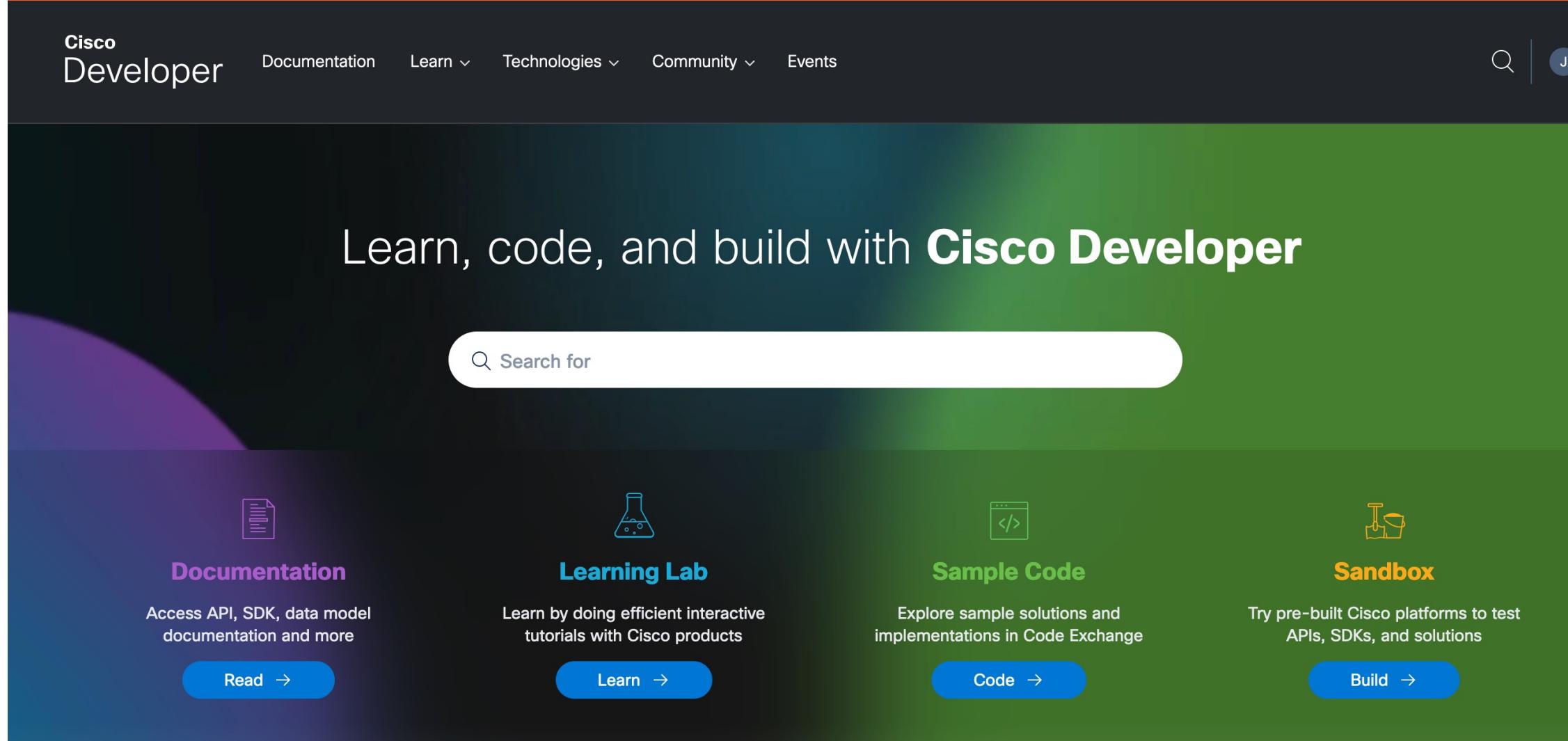
Sample Code

Explore sample solutions and implementations in Code Exchange

Sandbox

Try pre-built Cisco platforms to test APIs, SDKs, and solutions

Learn, code, and build with **Cisco Developer**



The image shows the homepage of the Cisco Developer website. At the top, there's a dark navigation bar with the Cisco Developer logo, a search bar, and a user profile icon. Below the header is a large, colorful background graphic with a gradient from purple to green. In the center, the text "Learn, code, and build with **Cisco Developer**" is displayed in a large, bold, white font. To the left of the main content area is a search bar with the placeholder "Search for". Below the search bar are four main sections: "Documentation", "Learning Lab", "Sample Code", and "Sandbox". Each section has an icon, a title, a brief description, and a blue call-to-action button at the bottom.

Section	Icon	Description	Action
Documentation	File icon	Access API, SDK, data model documentation and more	Read →
Learning Lab	Flask icon	Learn by doing efficient interactive tutorials with Cisco products	Learn →
Sample Code	Code icon	Explore sample solutions and implementations in Code Exchange	Code →
Sandbox	Tool icon	Try pre-built Cisco platforms to test APIs, SDKs, and solutions	Build →

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Welcome to the new Learning Labs

Interactive tutorials and built-in development environments to learn faster.

 Search Learning Labs

Search

[Security](#) [Cloud](#) [IoT](#) [Collaboration](#) [Data Center](#) [Networking](#)

Learning Tracks

- A collection of interactive tutorials
- For product suites and related concepts
- Complete in days
- Consecutive Learning Modules

[Explore Learning Tracks ↗](#)

Learning Modules

- A group of interactive tutorials
- For related use cases and skills
- Complete in hours
- Consecutive Learning Labs

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Learning Labs

- Single interactive tutorial
- For specific use case or skill
- Complete in less than an hour
- 58+ Labs to code in the browser

[Explore Learning Labs ↗](#)

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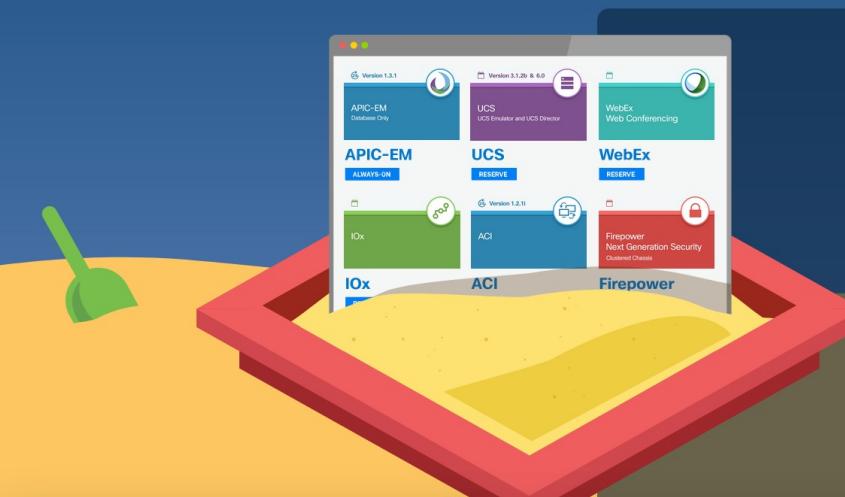
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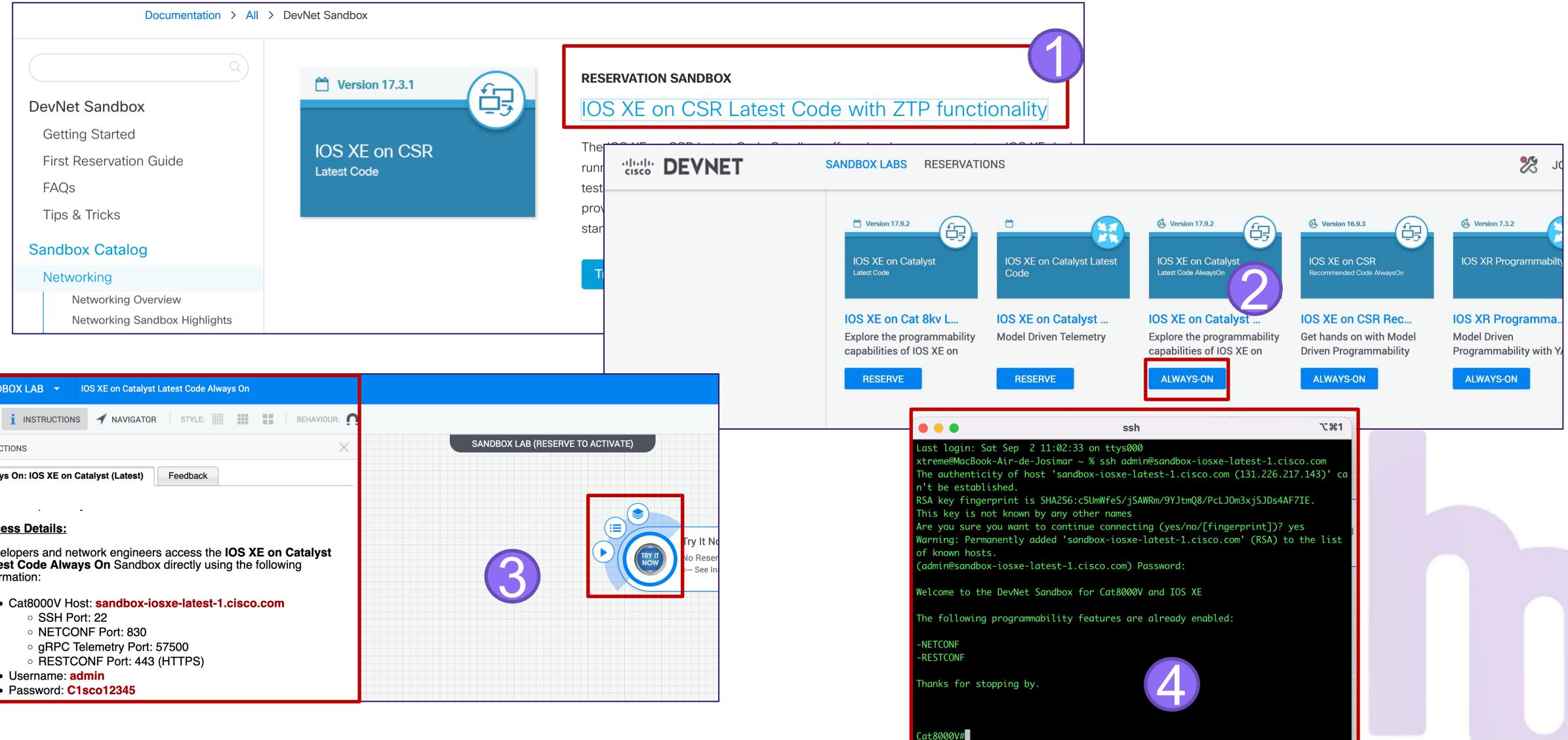


EXPLORE TECHNOLOGIES ▾

-  Networking
-  Data Center
-  Cloud
-  Security
-  IoT
-  Collaboration
-  Analytics &
-  Open Source

<https://developer.cisco.com>

developer.cisco.com > Sandbox > Networking > IoT XE on CSR



The image shows a step-by-step guide through the Cisco DevNet Sandbox interface:

- Step 1:** Reservation Sandbox. A red box highlights the "RESERVATION SANDBOX" section, which contains the text "IOS XE on CSR Latest Code with ZTP functionality".
- Step 2:** Reservation Options. A red box highlights the "ALWAYS-ON" button for the "IOS XE on CSR Recommended Code AlwaysOn" option.
- Step 3:** Activation. A red box highlights the "TRY IT NOW" button on the "SANDBOX LAB (RESERVE TO ACTIVATE)" screen.
- Step 4:** SSH Session. A red box highlights the terminal window showing the SSH session details:

```
Last login: Sat Sep 2 11:02:33 on ttys000
xtreme@MacBook-Air-de-Josimar ~ % ssh admin@sandbox-iosxe-latest-1.cisco.com
The authenticity of host 'sandbox-iosxe-latest-1.cisco.com (131.226.217.143)' can't be established.
RSA key fingerprint is SHA256:c5UmWfeS/jSAWRm/9YJtmQ8/PcLJ0m3xjSJDs4AF7IE.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'sandbox-iosxe-latest-1.cisco.com' (RSA) to the list
of known hosts.
(admin@sandbox-iosxe-latest-1.cisco.com) Password:

Welcome to the DevNet Sandbox for Cat8000V and IOS XE

The following programmability features are already enabled:
-NETCONF
-RESTCONF

Thanks for stopping by.

Cat8000V#
```

Próximos passos ...

Baixar o .ova do devasc

FAZER DEPLOY INICIAL (VM)



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EXPLORAR PLATAFORMA

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CRIAR GRUPO DA TURMA



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OBRIGADO
ありがとう

