Model-Driven Programmability

Target Audience

Emerging Technologies Workshops are short, hands-on experiences that expose students to the latest internet technologies. In each Workshop, you will learn new concepts, see how they work on real-world equipment, and quickly develop new skills for today's job market. The 8-hour format enables instructors to flexibly offer access to the latest technologies in 1-day workshops for current and former students.

With the increasing size of the modern network and the frequency of changes required by the business, managing and automating networks via a Command Line Interface (CLI) is ineffective and error prone. A new approach, using Model Driven Programmability, enables transactional changes, by defining standardized device models and APIs. This workshop introduces students to device level programmability competencies, to automate configuration and management tasks using standardized YANG device models and using the RESTCONF and NETCONF device level APIs.

Prerequisites

For proper skill building, the students should be familiar with the content and skills described in the following prerequisite and co-requisite skills:

- Basic programming.
- CCNA networking skills.

PC Hardware Requirements

- Computer with a minimum of 2 GB of RAM and 8 GB of free disk space.
- High speed Internet access to download software and work with online tools.

Curriculum Objectives

Every networking student will benefit in grasping the importance of YANG, as language to "model" a networking device, combined with the robustness of the RESTCONF and NETCONF device level programmability APIs. Students will also experiment and develop Python scripts to manage networking devices at scale, using the Model Driven Programmability approach.

Upon completion of the workshop, students will be able to perform the following tasks:

- Understand the value, set-up and use of software concepts and tools relevant to network programmability (Python scripting, Git, JSON, Postman, APIs).
- Describe a different approach to software-defined networking (SDN), including central application policy control.
- Use Python with combination of RESTCONF and NETCONF APIs to retrieve and update the device's configuration.
- Understand the value of joining professional communities of practice to working in the network programmability domain. Participate in Cisco DevNet, GitHub, and Stack.

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Course Outline

Table 1. Chapters, Sections, and Objectives

Chapter /Section	Objectives
Chapter 1: Introduction to Python and Programming Basics	
1.1: Code and Communities of Practice	Explain the importance of coders' communities of practice.
1.2: Python Basics	Use Python to create programs that accept user input and read and write to external files.
1.3: APIs and Parsing JSON	Create a Python application that accesses an API based on user input and processes and displays the JSON data that is returned.
Chapter 2: Model Driven Network Programmability	
2.1: Network Programmability	Describe a different approach to software-defined networking (SDN), including central application policy control. Use Python with combination of RESTCONF and NETCONF APIs to retrieve and update the device's configuration.
	Practice and labs:
	- CLI Automation with Python using netmiko.
	- YANG Data Models Using the pyang Tool.
	- Using protocols SSH, RESTCONF, NETCONF.
	- Using data formats JSON, XML, YAML.