ProTech Professional Technical Services, Inc.

Python for Network Automation

Course Summary

Description

This course is driven by demonstration and reinforced by hands-on labs for learning Python for Network Automation. Maximize your networking skill set by learning to script solutions to tedious, complex and oftentimes overwhelming networking tasks.

Automate front end interfaces, interact with APIs, open Telnet and SSH sessions, read and write data out of popular file types (including Excel), transform data between popular data structures like JSON and YAML, and most importantly, learn to interact with switches and routers across the most popular network vendors using multiple Python libraries.

Topics

- Reviewing Python Essentials
- Python and Data translation
- Python and RESTful APIs
- Automating SMTP and Extended SMTP (Email)
- Completing Webforms with Python
- Python and Telnet
- Python and SSH

- Automating Switches and Routers with Python
- Automating Networks with Python NAPALM
- Python and Network Captures
- Optimizations and Security
- Overview of Ansible (optional)

Audience

This course was written for networking professionals looking to expand their capabilities by automating their workload with Python. This includes: Network Engineers, Network Architects, System Admins, DevOps Engineers, Cisco Certified Professionals (CCNA, CCNP, CCIE), and developers interested in network programmability with Python.

Prerequisites

Keyboard proficiency, and some basic understanding of network concepts is the only hard requirement. Students with some previous exposure to Python, any another scripting experience, will take the most from the course. In lieu of any scripting experience, ProTech's Python Basics course is recommended.

Duration

Five days

Course Outline

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I. *Reviewing Python Essentials*
   A. Version Controlling Code
   B. Up and running with Python (installing on various platforms)
   C. Lists
   D. Dictionaries
   E. File Input and Output
   F. Functions
   G. Methods
   H. Review of the Standard Library
   I. Using pip and pypi.org

II. *Python and Data translation*
   A. JSON
      1. Reading from files
      2. Reading from API
   B. YAML
      1. Reading from files
   C. CSV
      1. Reading from files
   D. Excel
      1. Using pyexcel library
      2. Using pandas library

III. *Python and RESTful APIs*
   A. RESTful APIs decoded
   B. Reading attachments
   C. API keying
   D. Passing credentials securely
   E. Standard Library Solution
   F. 3rd party library solutions

IV. *Automating SMTP and Extended SMTP (Email)*
   A. SMTP
   B. Extended SMTP
   C. Automating Email solutions
   D. Setting headers and creating a body
   E. Attachments
   F. Google Gmail considerations
   G. Microsoft considerations

V. *Completing Webforms with Python*
   A. Web Scraping
   B. Automating front-ends with code
   C. Selenium for Automation
   D. Completing webforms
   E. Filling in data with data from open files
   F. How to select 'buttons'
   G. How to make 'clicks'

VI. *Python and Telnet*
   A. RFC 854 - Telnet Protocol
   B. Standard Library Solution

VII. *Python and SSH*
   A. Standard Library Solution
   B. Paramiko
      1. SSH Agents
      2. Key exchange and authorization
      3. Securing dealing with passwords
      4. Configuration
      5. SFTP
   C. Passing commands and capturing responses
   D. Parsing remote logs

VIII. *Automating Switches and Routers with Python*
   A. Netmiko
   B. Push / Pull Configuration
   C. Retrieve information about devices
   D. Manage the devices configuration
   E. Connecting and Running a Command on a Networking Device
   F. Enable & Global Config Mode
   G. Configure a Networking Device from a File
   H. Configuration Backup using Netmiko
   I. VLAN & VXLAN management
   J. BGP & OSPF Management
   K. Solutions for HSRP, VRRP, and GLBP

IX. *Automating Networks with Python NAPALM*
   A. Installation
   B. Tutorials
   C. Validating deployments
   D. Supported Devices
   E. Command Line Tool
   F. NetworkDriver
   G. YANG
   H. napalm-logs
   I. Integrations

X. *Python and Network Captures*
   A. Wireshark
   B. TCPDump
   C. Decoding network captures with Python
   D. *.pcap files
   E. *.pcap-ng files
Parsing network captures

Course Outline (cont'd)

XI. Optimizations and Security
- A. Multiprocessing and Multithreading
- B. Examples of running in parallel
- C. Cost and Benefit Considerations
- D. Secure hashes and digests
- E. MD5, SHA, and OpenSSL Options
- F. Encrypting content
- G. Considerations for credentials
- H. Securely passing input

XII. Overview of Ansible (optional)
- A. Relationship of Ansible and Python
- B. Overview and Installing
- C. Where YAML fits
- D. Modules for Cisco, Juniper, Arista, and other major vendors
    1. shell, raw, copy, file, apt, service, cli_command, cli_config
- E. Constructing the playbook
- F. Applications of Python versus Ansible
- G. Writing an Ansible module with Python

Labs

Lab 01 - Using vim
Lab 02 - Making and Syncing a Github account
Lab 03 - Working with Local FIles
Lab 04 - Working with CSV, YAML and JSON
Lab 05 - Interacting with the web browser
Lab 06 - Interacting with APIs
Lab 07 - APIs, pip, and requests
Lab 08 - Python and Excel
Lab 09 - Automating SMTP (Email)
Lab 10 - Web Scraping Data
Lab 11 - Automating Front End Webforms
Lab 12 - Python and Telnet
Lab 13 - Python and SSH
Lab 14 - Introducing Paramiko
Lab 15 - Automating Commands Across SSH
Lab 16 - Paramiko and SFTP
Lab 17 - SSH and Remote Server Management
Lab 18 - Virtualizing Switches with GNS3
Lab 19 - Installing Switch Configuration
Lab 20 - Performing ICMP checks (ping)
Lab 21 - Router and Switch management
Lab 22 - Netmiko for Router and Switch Automation
Lab 23 - Writing a Netmiko Application
Lab 24 - Creating Rollbacks

Lab 25 - Intro Network Automation with NAPALM
Lab 26 - Switch Validation and NAPALM
Lab 27 - Switch Changes and Rollback with NAPALM
Lab 28 - Manipulating Switches via APIs
Lab 29 - Creating Network Compliance Files
Lab 30 - Error Handling
Lab 31 - Python for Network Captures and Wireshark
Lab 32 - Python for Analyzing Network Traffic
Lab 33 - Python and Regular Expression for Searching
Lab 34 - Parsing Log Files with Regular Expression
Lab 35 - Python Cisco Configuration Parser
Lab 36 - Threads and Parallel Processes
Lab 37 - Secure Hashes and Message Digests
Lab 38 - Securely Accepting Input and Encryption
Lab 39 - Introduction to Python Ansible (Optional)
Lab 40 - Introduction to Network Automation with Python Ansible (Optional)