Python for Network Engineers Training

Duration: **5 Day**

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This Python course focuses on using Python for**network automation** and **network DevOps**.

The main goal of the course is to get participants working with Python and network automation as quickly as possible. Rather than concentrating on turning delegates into advanced software developers, the course focuses on practical use of network automation libraries such as netmiko and NAPALM, together with APIs and protocols such as NETCONF.

For this reason, the program places greater emphasis on automating configuration, collecting information from network devices, working with network APIs, and managing network operations than on advanced Object-Oriented Programming.

Hands-on sessions use Cisco and Juniper devices, giving participants practical experience in applying Python to real network administration tasks. The course helps network professionals save time by automating repetitive activities and improving operational efficiency.

Prerequisites

There are no formal prerequisite courses.

However, participants should already have a good understanding of how IP networking works.

A TCP/IP foundation-level course may be useful for those who want to strengthen their networking knowledge before attending.

What You Will Learn

By the end of the course, participants should be able to:

- Run Python programs.
- Read and understand Python programs.
- Write Python programs.
- Debug Python programs.
- Automate network tasks with Python.
- Configure network devices through Python.
- Collect data from network devices using Python.

Training Outline

What Is Python?

Topics

- Programming languages

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- Why Python?
- Python in interactive mode
- Python scripts
- IPython
- Python 2 versus Python 3
- A simple Python script
- Comments

Hands-on

- Installing Python
- Hello World

A Network Example

Topics

- On-box versus off-box Python
- Telnet
- SSH
- NETCONF
- HTTP
- APIs
- Manufacturer API support
- Analysis of a simple telnetlib program

Hands-on

- Using Python to retrieve configuration from a network device
- Analysing the activity with Wireshark

Python Basics

Topics

- Input / Output
- Operators
- Variables and assignment
- Types
- Indentation
- Loops
- Conditionals

Hands-on

- Modifying the Telnet program
- Changing configurations on network devices

Functions, Classes and Methods

Topics

- What functions are
- Calling functions

- Built-in functions
- Useful built-in functions
- File handling
- Classes
- Objects
- Creating instances

Hands-on

- Storing configurations in files
- Configuring devices from files
- Using an inventory file to work with multiple devices

Libraries and Modules

Topics

- Modules
- Files and packages
- import
- from-import
- The Python Standard Library
- Third-party packages
- pip install
- Executing external programs
- Managing Python libraries

Hands-on

- Using pip
- Installing and using ipaddress
- Using subprocess to access netsnmp
- Using the sockets library for more advanced participants

Paramiko and Netmiko

Topics

- SSH
- Enabling SSH on devices
- Keys
- Paramiko versus Netmiko
- Example scripts
- pexpect

Hands-on

- Configuring VLANs from Python

pySNMP

Topics

- Gathering facts using previous methods

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- SNMP review
- pySNMP GET
- pySNMP and SNMPv3
- easySNMP library

Hands-on

- Walking a MIB from Python

NETCONF

Topics

- What is NETCONF?
- Enabling NETCONF on devices
- A first ncclient script
- Device handlers
- get_config
- edit_config
- copy_config
- delete_config
- commit
- validate
- PyEZ
- utils_config
- utils.sw

Hands-on

- Configuration with ncclient
- Configuration with PyEZ
- Extended JunOS automation coverage for interested participants

Manipulating Configuration Files

Topics

- Built-in functions
- String handling
- Unicode
- Sequences
- Strings
- Lists
- Tuples
- Dictionaries
- TextFSM
- Regular expressions
- JSON
- YAML
- XML
- YANG
- Jinja2
- Templates

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Hands-on

- Using Jinja2 templating with Python to configure network devices

NAPALM

Topics

- Getters
- Configuration operations
- Supported devices
- NAPALM transport
- Config-replace
- Config-merge
- Compare config
- Atomic changes
- Rollback
- Example NAPALM scripts

Hands-on

- Using NAPALM to gather facts
- Using NAPALM for configuration management

REST and RESTCONF

Topics

- What is REST?
- HTTP methods
- GET
- POST
- cURL
- Postman
- Python requests library
- RESTCONF
- RESTCONF example

Hands-on

- Modifying a configuration using RESTCONF

Scapy

Topics

- What is Scapy?
- Scapy in interactive mode
- Scapy as a module

Hands-on

- Packet crafting from Python

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Error Handling

Topics

- Errors and exceptions
- Exception handling
- try
- except
- Memory management
- Garbage collection
- Context management
- with

Hands-on

- Improving Python code

Nornir

Topics

- What is Nornir?
- Network automation framework
- Inventories
- Connection management
- Parallelization
- Nornir architecture
- Related libraries

Hands-on

- Setting up Nornir
- Nornir fact gathering
- Nornir tasks

Optional Topics

Topics

- Writing your own functions
- Writing your own classes
- pyntc

Hands-on

- Writing reusable code