

## LAB 3 – NETMIKO, YANG, NETCONFIG and RESTCONFIG

In dit lab experimenteer je met 8 praktijkopdrachten die je network programmability vaardigheden testen.

**Documenteer** je bevindingen in **GitHub** per onderdeel in **3 stappen**. Doe dit voor iedere praktijkopdracht afzonderlijk. Gebruik Markdown om een duidelijke structuur te brengen.

### Task Preparation and Implementation:

- Beschrijf de voorbereiding en implementatie van de taak.
- Leg uit welke stappen, tools of methoden je hebt gebruikt om het onderdeel te voltooien.

### Task Troubleshooting:

- Noteer eventuele problemen die je bent tegengekomen en hoe je deze hebt opgelost.
- Vermeld welke oplossingen of benaderingen je hebt geprobeerd.

### Task Verification:

- Leg uit hoe je hebt gecontroleerd of de taak succesvol was.
- Beschrijf de testmethoden of technieken die je hebt gebruikt om de taak te verifiëren.

Deel je GitHub-repository met je lector door een e-mail te sturen naar *wim.leppens@pxl.be* (gebruikersnaam: *wlepxl*). Vermeld duidelijk je **naam en voornaam** in de repository.

De benodigde ISO- en OVA-bestanden (Part 2) kun je downloaden via [Cursusinhoud > Varia > Network Tools](#).

## Part 1: Install the virtual lab environment

Perform the following lab.

### 1.1.2 Lab - Install the Virtual Lab Environment

Document your findings and important commands.

## Part 2: Install the CSR1000v VM

Perform the following lab.

### 7.0.3 Lab - Install the CSR1000v VM

Document your findings and important commands.

## Part 3: Python Network automation with NETMIKO

Search for a script to work and communicate with Cisco IOS-XE network devices using **Netmiko**. The virtual router deployed in the previous step can be used to run your script.

As a starting point, you can use the netmiko script in the following github repository:

### api\_netmiko\_example.py

Other useful scripts can be found via the GitHub repository below:

### wlepxl/PythonExperiments

### 3a: Connecting to an IOS-XE Device

Start with a simple script and gradually expand it with additional features.

- Send show commands to a single device
- Send configuration commands to a single device
- Run show commands and save the output
- Backup the device configurations to an external file
- Send device configuration using an external file
- Configure a subset of interfaces
- Connect using a Python Dictionary
- Execute a script with functions or classes
- Execute a script with conditional statements (if, else)
- Send show commands to multiple devices
- Send configuration commands to multiple devices

### 3b: Create a Challenging and useful Script for a network engineer.

- Create an exciting and challenging script that a network engineer in a programmable era would use every day. Surprise your lecturer!

Document your findings and important commands.

## Part 4: Explore YANG Models

Perform the following lab.

### **8.3.5 Lab - Explore YANG Models**

Document your findings and important commands.

## Part 5: Use NETCONF to Access an IOS XE Device

Perform the following lab.

### **8.3.6 Lab - Use NETCONF to Access an IOS XE Device**

Document your findings and important commands.

## Part 6: Use RESTCONF to Access an IOS XE Device

Perform the following lab.

### **8.3.7 Lab - Use RESTCONF to Access an IOS XE Device**

Document your findings and important commands.

## Part 7: Getting started with NETCONF/YANG – Part 1

In this task, you need to read and understand the community document below about NETCONF/YANG.

### **Getting Started with NETCONF/YANG – Part 1 - Cisco Community**

The document explains how to use NETCONF/YANG to programmatically change the VLAN membership of a switch interface.

After reading the document and conducting additional research, you should be able to understand and apply the basics to get started with NETCONF/YANG, including:

- Establish NETCONF connections from a terminal (without Python) to your virtual router
- Test the transport
- Check the capabilities
- Use a NETCONF tool
- Customize responses using pretty-print
- Understand RPC calls
- Grasp the concept of structured data.

Document your findings and important commands.

## Part 8: Getting started with NETCONF/YANG – Part 2

In this task, you need to read and understand the community document below about NETCONF/YANG.

### [Getting Started with NETCONF/YANG – Part 2 - Cisco Community](#)

After reading the document and conducting additional research, you should be able to understand and work with NETCONF/YANG, including:

- Using NCC (NETCONF Client)
- Creating a virtual environment for Python
- Understanding and applying structured data
- Understanding the concept of containers and leaves
- Using filters, RPC calls, and actions
- Differentiating between operational data (statistics) and configuration data
- Making configuration changes on a network device using the NCC client

Document your findings and important commands.