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Lab – Explore YANG Models Using the pyang Tool

Objectives

Part 1: Install the pyang Python module

Part 2: Download YANG models for the IOS XE

Part 3: Use the pyang command line tool to transform the YANG models

Background / Scenario

YANG models define the exact structure, data types, syntax and validation rules for the content of messages exchanged between a managed device and another system communicating with the device. Working with files using the YANG language can be a bit overwhelming for the level of details in these files.

In this lab, you will learn how to use the open source pyang tool to transform YANG data models from files using the YANG language, into a much more easily human readable format. Using the “tree” view transformation, you will identify what are the key elements of the ietf-interfaces YANG model.

Required Resources

- Access to the Internet
- Python 3.x environment

Instructions

Part 1: Install the pyang Python module

In this part, you will install pyang module into your Python environment. Pyang is a python module that simplifies working with YANG files. The Pyang Python module comes with a pyang command line executable that transforms YANG files into a more human readable format (tree, html, etc.).

Step 1: Use pip to install pyang.

- Start a new Windows command prompt (cmd).
- Install pyang using pip in the Windows command prompt:

```
pip install --no-binary pyang pyang
```

NOTE: on mac or linux you can simply “pip install pyang” but temporarily on Windows the binary WHL file won’t include the Windows executable pyang file.

- Verify that pyang has been successfully installed. In the command prompt, type:

```
pyang -v
```

to display the installed pyang version.

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```
C:\Windows\System32\cmd.e x + v
pip install [options] [-e] <local project path> ...
pip install [options] <archive url/path> ...

no such option: --upgrade

C:\Users\azray\Documents\Cuarto\Programacion\UNIDAD_3>pip install --upgrade setuptools
Collecting setuptools
  Obtaining dependency information for setuptools from https://files.pythonhosted.org/packages/bb/e1/ed2dd0850446b8697ad
  28d118df885ad04140c64ace06c4bd559f7c8a94f/setuptools-69.0.2-py3-none-any.whl.metadata
  Downloading setuptools-69.0.2-py3-none-any.whl.metadata (6.3 kB)
  Downloading setuptools-69.0.2-py3-none-any.whl (819 kB)
    819.5/819.5 kB 3.7 MB/s eta 0:00:00
Installing collected packages: setuptools
Successfully installed setuptools-69.0.2

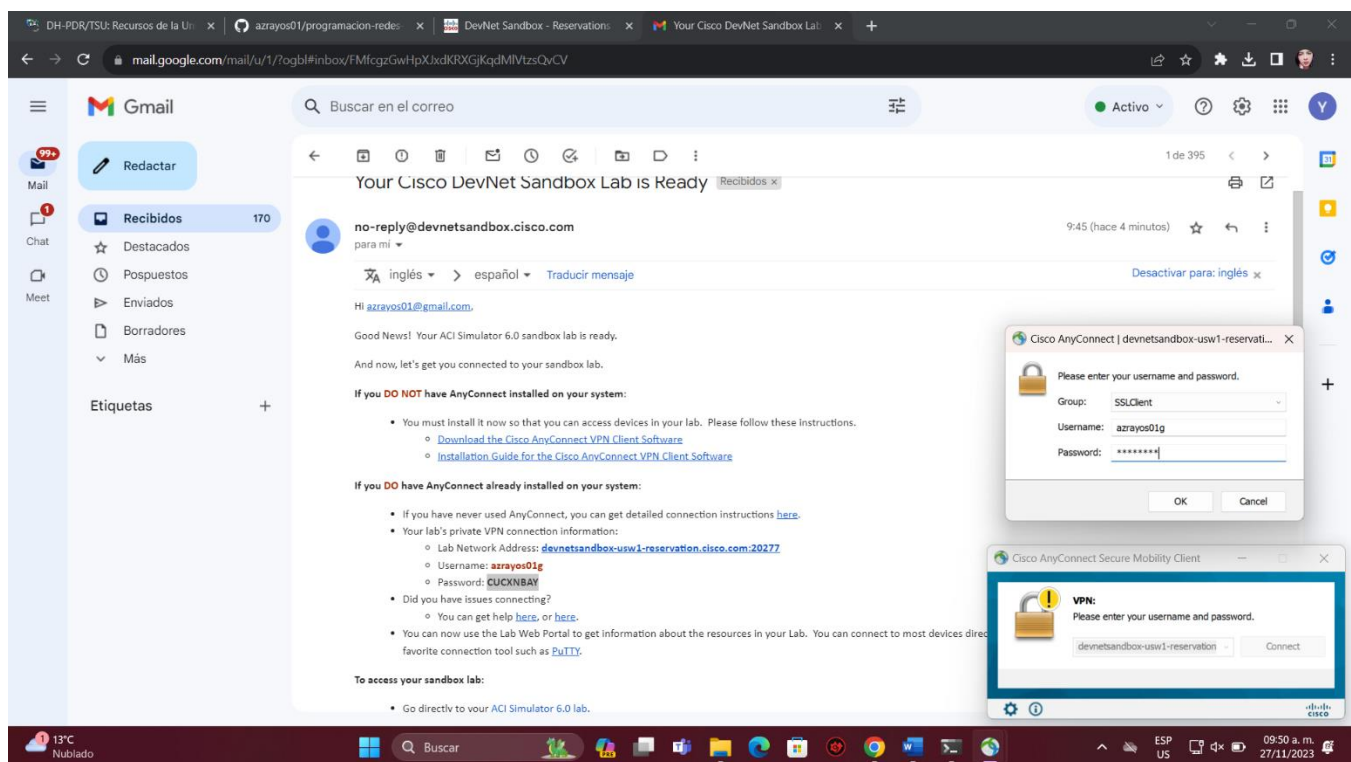
[notice] A new release of pip is available: 23.2.1 -> 23.3.1
[notice] To update, run: python.exe -m pip install --upgrade pip

C:\Users\azray\Documents\Cuarto\Programacion\UNIDAD_3>pip install --no-binary pyang pyang
Requirement already satisfied: pyang in c:\users\azray\appdata\local\programs\python\python312\lib\site-packages (2.5.3)
Requirement already satisfied: lxml in c:\users\azray\appdata\local\programs\python\python312\lib\site-packages (from py
ang) (4.9.3)

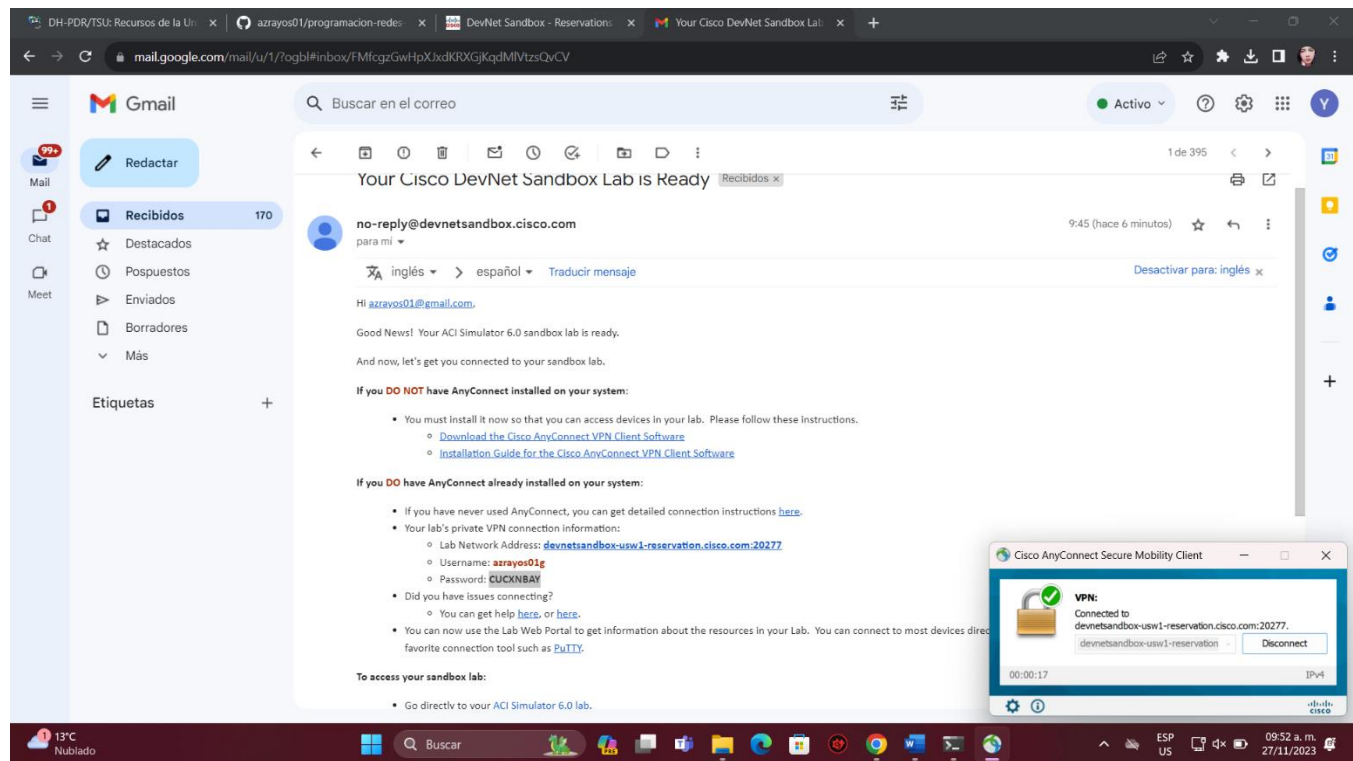
[notice] A new release of pip is available: 23.2.1 -> 23.3.1
[notice] To update, run: python.exe -m pip install --upgrade pip

C:\Users\azray\Documents\Cuarto\Programacion\UNIDAD_3>pyang -v
pyang 2.5.3

C:\Users\azray\Documents\Cuarto\Programacion\UNIDAD_3>
```



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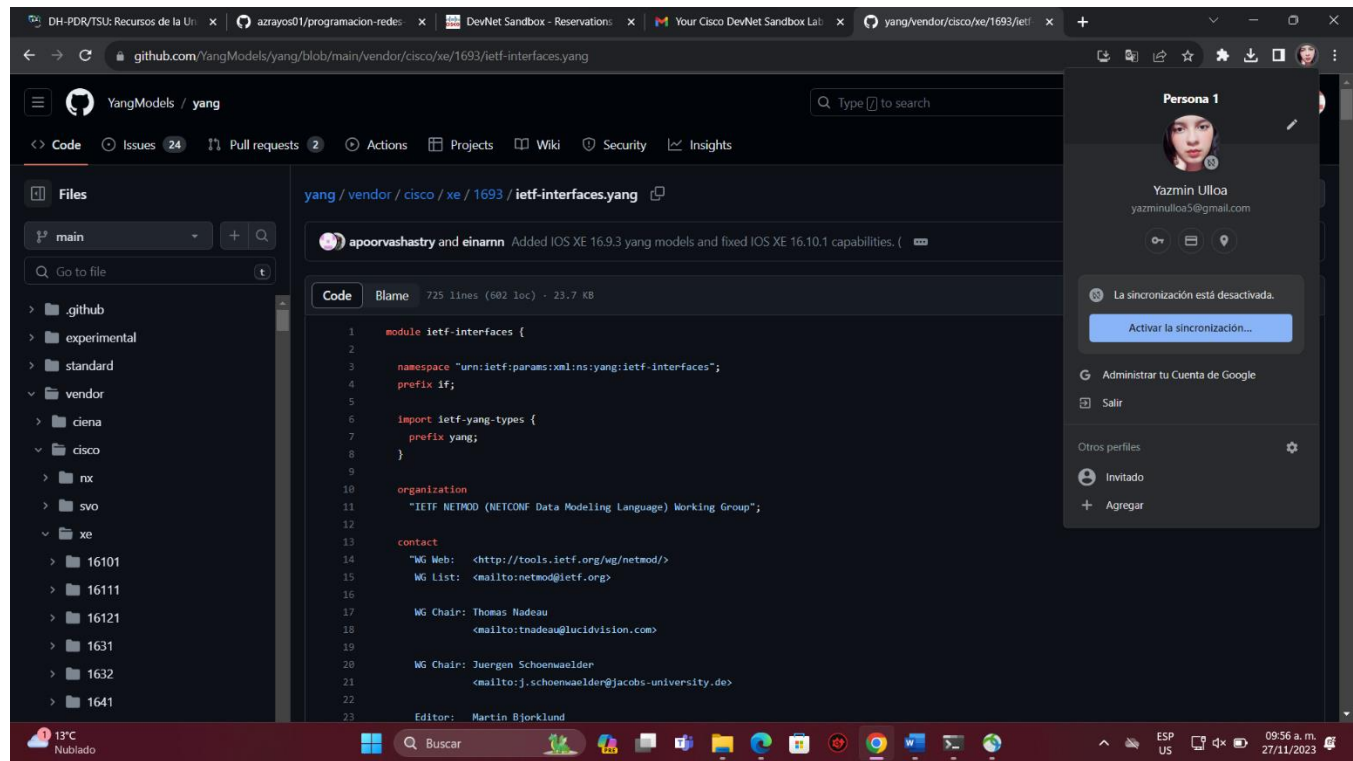


Download YANG models for the IOS XE

Explore YANG models on the YangModels/yang GitHub repository.

- Using a web browser, navigate to <https://github.com/YangModels/yang>:
- Navigate to the vendor -> cisco -> xe -> 1693 directory. This directory represents all the YANG models that are supported in Cisco operating system IOS XE in version 16.9.3.
- Explore the ietf-interfaces.yang model.

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Step 2: Download the YANG models for the IOS XE VM

- Unpack the YANG models from the official GitHub repo for cisco-xe-1693.zip archive file that contains a snapshot of the files in the GitHub repository.

Part 2: Use the pyang command line tool to transform the YANG models

- Start a Windows command prompt and navigate to the directory with the extracted archive file.
- Use the pyang tool to transform YANG files to a human readable format, for example using the “tree” format transformation:

```
pyang -f tree ietf-interfaces.yang
```

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```
C:\Windows\system32\cmd.exe: X + v
Microsoft Windows [Versión 10.0.22631.2715]
(c) Microsoft Corporation. Todos los derechos reservados.

C:\Users\azray>cd Downloads

C:\Users\azray\Downloads>dir *.yang
El volumen de la unidad C no tiene etiqueta.
El número de serie del volumen es: 84FA-B5B0

Directorio de C:\Users\azray\Downloads

27/11/2023  10:14 a. m.           24,248 ietf-interfaces.yang
             1 archivos          24,248 bytes
             0 dirs  417,534,775,296 bytes libres

C:\Users\azray\Downloads>pyang -f tree ietf-interfaces.yang
module: ietf-interfaces
+--rw interfaces
|   +--rw interface* [name]
|   |   +--rw name                string
|   |   +--rw description?        string
|   |   +--rw type                 identityref
|   |   +--rw enabled?             boolean
|   |   +--rw link-up-down-trap-enable? enumeration {if-mib}?
+--ro interfaces-state
|   +--ro interface* [name]
|   |   +--ro name                string
|   |   +--ro type                 identityref
|   |   +--ro admin-status         enumeration {if-mib}?
|   |   +--ro oper-status          enumeration
```

- c. Explore other YANG modules, for example the Cisco Native model for CDP: `Cisco-IOS-XE-cdp.yang`
- d. Are there any “read only” operation data in the `Cisco-IOS-XE-cdp.yang` model
- e. Is there any other YANG model that includes operational CDP data?