Assignment #1

NES 470, Fall 2023, Dr. Ahmad T. Al-Hammouri

Due date: Tuesday 31/10/2023 at 11:55pm.

Objectives:

To develop a simple network automation program utilizing the CLI.

Problem Statement:

In this assignment, you will develop a **Python script** that acts as a minimalist network automation application. The network management application implements a remote counterpart to the Linux's `top` utility by sending the required commands to a **Cisco** router, and receiving and displaying their output in a convenient, well-formatted manner.

The script requirements are as follows:

1. The script accepts **two** command line arguments:
   - The IP address of the router, e.g., `192.168.1.101`, and
   - An integer, n, representing the maximum number of processes to display their information.

   For example, the script must be run as follows
   `python3 ID-xxxxxx.py 192.168.1.19 7`
   where '`xxxxxx`' is your student ID.
2. The script will be executed on a Linux machine.
3. The script sends the appropriate command(s) to the router to obtain the list of processes and their information.
4. The script displays on the standard output the following information for each of the n processes: the process ID (PID), the process name, the memory allocated by the virtual process, and the number of times the process has been invoked.
5. The output must be in the following format

```
PID    P. Name          Mem. Allocated    No. Invoked
---    -------------    --------------    -----------
1      Chunk Manager    1297032           26
2      Load Meter       448               1781
3      MCP TIPC         0                 61
⋮      ⋮                ⋮                 ⋮
7      EDDRI_MAIN       65632             1
```

6. The processes in the output must be ordered based on the PID and in ascending order.
7. The script uses the `netmiko` package to be able to talk to the Cisco router.
8. *You are allowed to use **ONLY** the Python Standard Library*, but **not** any other libraries developed by any third party, except the `netmiko` package.

Hints:

1. Start by installing `netmiko` on the Linux machine with `pip3 install netmiko`.

2. Download the sample program that accompanies this assignment from `elearning`, and make sure it runs successfully, perhaps after changing the path to the Python interpreter and the IP address of the CSR 1000v router.
3. Modify the sample program to accomplish the requirements of this assignment. The sample program is based on the following resource `https://bit.ly/3su0imp`.
4. You are highly encouraged to use **RegExs** to extract the required information from the retrieved data.

Grading Policy:

- You must turn in only **working code**. If your code gives run-time errors, you will receive **zero** credit.
- Partial credit is given only for working code that does not implement all the requirements above.
- *Part of your score will depend on the elegant formatting of the output.*

Deliverables:

- Name the script file as follows `ID-xxxxxx.py`, where '`xxxxxx`' is your student ID.
- Submit **ONLY** the Python script file to the `elearning` via the provided link. Do **NOT** send it via e-mail or a message from within the `elearning` even before the deadline because it will be deleted tacitly.
- ONLY one student from each group must submit the file.