LAB – USING LISTS AND DICTIONARIES

OBJECTIVE

In this lab, you will be reading device information from a file, and storing that information in lists and dictionaries.

PART 1

Open a terminal and switch to the lab directory

STEP 1: OPEN A TERMINAL WINDOW

Double-click the Terminal icon on the desktop to open the terminal window for use in this lab.

STEP 2: CHANGE DIRECTORY

Change to the directory **labs/prne/** in the user home directory, which holds the files for the course labs.

```
~$ cd labs/prne/
```

PART 2

Open **Visual Studio Code**, create a new file and save it with a filename of **using-lists-and-dictionaries-part-2.py**. Ensuring to save the file in the **~/labs/prne/** directory, as otherwise the code will require modification to find the associated files that are used. This python application will read the device information from the file, and display the items from the file into a python list.

STEP 1: IMPORT PPRINT

Import the pprint function to enable displaying the list nicely formatted.

```
# Import required modules/packages/library
from pprint import pprint
```

STEP 2: CREATE EMPTY LIST

Create an empty list called device_info.

```
# Create the device_info list
device_info = []
```

STEP 3: OPEN FILE FOR READING

Open the file **devices-03.txt** for reading.

```
# Open the file and read the single line of device info
file = open('devices-03.txt', 'r')
file_line = file.readline().strip()
```

STEP 4: DISPLAY CONTENTS READ IN

Display the contents of the file that was read in.

```
# Display the line from the file
print('Read line: ', file_line)
```

STEP 5: CREATE LIST

Put the contents of the file into a list, splitting the string using the comma.

```
# Use the string 'split' function to convert
# the comma-separated string into a list of items
device_info = file_line.split(',')
```

STEP 6: DISPLAY THE LIST

Display in the terminal the list nicely formatted.

```
# Display a blank line to make easier to read
print('')

# Display a title
print('Input converted to a list:')

# Display the list with nice formatting
pprint(device_info)
```

STEP 7: CLOSE FILE

Close the file.

```
# Close the file
file.close()
```

STEP 8: SAVE, RUN AND VERIFY APPLICATION

Save you application and then run it from the terminal rather than from within visual studio code.

```
~/labs/prne$ python3 using-lists-and-dictionaries-part-2.py
```

The output from your application will be displayed in your terminal window, verify that it is comparable to below.

```
devasc@labvm:~/labs/prne$ python3 using-lists-and-dictionaries-part-2.py
Read line:  device1,ios,10.3.21.5,user1,pass1

Input converted to a list:
['device1', 'ios', '10.3.21.5', 'user1', 'pass1']
devasc@labvm:~/labs/prne$
```

PART 3

Open **Visual Studio Code**, create a new file and save it with a filename of **using-lists-and-dictionaries-part-3.py**. Ensuring to save the file in the **~/labs/prne/** directory, as otherwise the code will require modification to find the associated files that are used. This python application will read the device information from the file, and display the items from the file into a python dictionary.

STEP 1: IMPORT PPRINT

Import the pprint function to enable displaying the list nicely formatted.

```
# Import required modules/packages/library
from pprint import pprint
```

STEP 2: CREATE EMPTY LIST

Create an empty list called device_info.

```
# Create the device_info list
device_info = {}
```

STEP 3: OPEN FILE FOR READING

Open the file **devices-03.txt** for reading.

```
# Open the file and read the single line of device info
file = open('devices-03.txt', 'r')
file_line = file.readline().strip()
```

STEP 4: DISPLAY CONTENTS READ IN

Display the contents of the file that was read in.

```
# Display the input from the file
print('Read line: ', file_line)
```

STEP 5: CREATE LIST

Put the contents of the file into a list, splitting the string using the comma.

```
# Use the string 'split' function to convert
# the comma-separated string into a list of items
device_info_list = file_line.split(',')
```

STEP 6: CREATE DICTIONARY

Create a dictionary using the items in the list.

```
# Now put those items from the list into our dictionary
device_info['name'] = device_info_list[0]
device_info['os-type'] = device_info_list[1]
device_info['ip'] = device_info_list[2]
device_info['username'] = device_info_list[3]
device_info['password'] = device_info_list[4]
```

STEP 7: DISPLAY THE DICTIONARY

Display in the terminal the dictionary nicely formatted.

```
# Display a blank line to make easier to read
print('')

# Display a title
print('Input converted to a dictionary:')

# Display the dictionary with nice formatting
pprint(device_info)
```

STEP 8: CLOSE FILE

Close the file.

```
# Close the file
file.close()
```

STEP 9: SAVE, RUN AND VERIFY APPLICATION

Save you application and then run it from the terminal rather than from within visual studio code.

```
~/labs/prne$ python3 using-lists-and-dictionaries-part-3.py
```

The output from your application will be displayed in your terminal window, verify that it is comparable to below.

```
devasc@labvm:~/labs/prne$ python3 using-lists-and-dictionaries-part-3.py
Read line:  device1,ios,10.3.21.5,user1,pass1

Input converted to a dictionary:
{'ip': '10.3.21.5',
 'name': 'device1',
 'os-type': 'ios',
 'password': 'pass1',
 'username': 'user1'}
devasc@labvm:~/labs/prne$
```

PART 4

Open **Visual Studio Code**, create a new file and save it with a filename of **using-lists-and-dictionaries-part-4.py**. Ensuring to save the file in the **~/labs/prne/** directory, as otherwise the code will require modification to find the associated files that are used. This python application will read multiple device information from the file, and display the items from the file into a list comprised of dictionaries.

STEP 1: IMPORT PPRINT

Import the pprint function to enable displaying the list nicely formatted.

```
# Import required modules/packages/library
from pprint import pprint
```

STEP 2: CREATE EMPTY LIST

Create an empty list called devices to be the outer list.

```
# Create the outer list for all devices
devices = []
```

STEP 3: OPEN FILE FOR READING

Open the file **devices-04.txt** for reading the information one line at a time. Put the information for each device into a list.

```
# Open the file and read the list of device info
file = open('devices-04.txt', 'r')
for line in file:

    # Get device info into list
    device_info_list = line.strip().split(',')
```

STEP 4: CREATE DICTIONARY FOR EACH DEVICE

For each device, take the device information and put it into a dictionary.

```
    # Put device information into dictionary for this one device
    device_info = {}  # Create the inner dictionary of device info
    device_info['name'] = device_info_list[0]
    device_info['os-type'] = device_info_list[1]
    device_info['ip'] = device_info_list[2]
    device_info['username'] = device_info_list[3]
    device_info['password'] = device_info_list[4]
```

STEP 5: DISPLAY CONTENTS

Display the contents of the file that was read in and what has been built so far.

```
    # Display what we have read and built so far
    print('Read device information: ', device_info)
```

STEP 6: CREATE LIST

For each device, take the device information dictionary you have created and put the dictionary into the device list.

```
    # Now append our device and its info onto our 'devices' list
    devices.append(device_info)
```

STEP 7: DISPLAY THE LIST OF DICTIONARIES

Display in the terminal the list of dictionaries nicely formatted.

```
# Display a blank line to make easier to read
print('')

# Display a title
print('Input converted to a list containing dictionaries:')

# Display the list with nice formatting
pprint(devices)
```

STEP 8: CLOSE FILE

Close the file.

```
# Close the file
file.close()
```

STEP 9: SAVE, RUN AND VERIFY APPLICATION

Save you application and then run it from the terminal rather than from within visual studio code.

```
~/labs/prne$ python3 using-lists-and-dictionaries-part-4.py
```

The output from your application will be displayed in your terminal window, verify that it is comparable to below.

```
devasc@labvm:~/labs/prne$ python3 using-lists-and-dictionaries-part-4.py
Read device information:  {'name': 'device1', 'os-type': 'ios', 'ip': '10.3.21.5', 'username': 'user1', 'password': 'pass1'}
Read device information:  {'name': 'device2', 'os-type': 'ios', 'ip': '10.3.21.6', 'username': 'user2', 'password': 'pass2'}
Read device information:  {'name': 'device3', 'os-type': 'nx-os', 'ip': '10.3.21.7', 'username': 'user3', 'password': 'pass3'}
Read device information:  {'name': 'device4', 'os-type': 'nx-os', 'ip': '10.3.21.8', 'username': 'user4', 'password': 'pass4'}
Read device information:  {'name': 'device5', 'os-type': 'ios-xr', 'ip': '10.3.21.9', 'username': 'user5', 'password': 'pass5'}
Read device information:  {'name': 'device6', 'os-type': 'ios-xr', 'ip': '10.3.21.10', 'username': 'user6', 'password': 'pass6'}

Input converted to a list containing dictionaries:
[{'ip': '10.3.21.5',
  'name': 'device1',
  'os-type': 'ios',
  'password': 'pass1',
  'username': 'user1'},
 {'ip': '10.3.21.6',
  'name': 'device2',
  'os-type': 'ios',
  'password': 'pass2',
  'username': 'user2'},
 {'ip': '10.3.21.7',
  'name': 'device3',
  'os-type': 'nx-os',
  'password': 'pass3',
  'username': 'user3'},
 {'ip': '10.3.21.8',
  'name': 'device4',
```

PART 5

Open **Visual Studio Code**, create a new file and save it with a filename of **using-lists-and-dictionaries-part-5.py**. Ensuring to save the file in the **~/labs/prne/** directory, as otherwise the code will require modification to find the associated files that are used. This python application will read multiple device information from the file, and display the items from the file into a dictionary comprised of dictionaries.

STEP 1: IMPORT PPRINT

Import the pprint function to enable displaying the list nicely formatted.

```
# Import required modules/packages/library
from pprint import pprint
```

STEP 2: CREATE EMPTY DICTIONARY

Create an empty dictionary called devices to be the outer dictionary.

```
# Create the outer dictionary for all devices
devices = {}
```

STEP 3: OPEN FILE FOR READING

Open the file **devices-04.txt** for reading the information one line at a time. Put the information for each device into a list.

```
# Open the file and read the list of device info
file = open('devices-04.txt', 'r')
for line in file:

    # Get device info into list
    device info list = line.strip().split(',')
```

STEP 4: CREATE DICTIONARY FOR EACH DEVICE

For each device, take the device information and put it into a dictionary.

```
    # Put device information into dictionary for this one device
    device_info = {}  # Create the inner dictionary of device info
    device_info['name'] = device_info_list[0]
    device_info['os-type'] = device_info_list[1]
    device_info['ip'] = device_info_list[2]
    device_info['username'] = device_info_list[3]
    device_info['password'] = device_info_list[4]
```

STEP 5: DISPLAY CONTENTS

Display the contents of the file that was read in and what has been built so far.

```
    # Display what we have read and built so far
    print('Read device information: ', device_info)
```

STEP 6: CREATE LIST

For each device, take the device information dictionary you have created and put the dictionary into the outer device dictionary.

```
    # Now place our device and its info onto our 'devices' dictionary
    devices[device_info['name']] = (device_info)
```

STEP 7: DISPLAY THE DICTIONARY

Display in the terminal the dictionary nicely formatted.

```
# Display a blank line to make easier to read
print('')

# Display a title
print('Input converted to a list containing dictionaries:')

# Display the dictionary with nice formatting
pprint(devices)
```

STEP 8: CLOSE FILE

Close the file.

```
# Close the file
file.close()
```

STEP 9: SAVE, RUN AND VERIFY APPLICATION

Save you application and then run it from the terminal rather than from within visual studio code.

```
~/labs/prne$ python3 using-lists-and-dictionaries-part-5.py
```

The output from your application will be displayed in your terminal window, verify that it is comparable to below.

```
devasc@labvm:~/labs/prne$ python3 using-lists-and-dictionaries-part-5.py
Read device infromation:  {'name': 'device1', 'os-type': 'ios', 'ip': '10.3.21.5', 'username': 'user1', 'password': 'pass1'}
Read device infromation:  {'name': 'device2', 'os-type': 'ios', 'ip': '10.3.21.6', 'username': 'user2', 'password': 'pass2'}
Read device infromation:  {'name': 'device3', 'os-type': 'nx-os', 'ip': '10.3.21.7', 'username': 'user3', 'password': 'pass3'}
Read device infromation:  {'name': 'device4', 'os-type': 'nx-os', 'ip': '10.3.21.8', 'username': 'user4', 'password': 'pass4'}
Read device infromation:  {'name': 'device5', 'os-type': 'ios-xr', 'ip': '10.3.21.9', 'username': 'user5', 'password': 'pass5'}
Read device infromation:  {'name': 'device6', 'os-type': 'ios-xr', 'ip': '10.3.21.10', 'username': 'user6', 'password': 'pass6'}

Input converted to a dictionary containing dictionaries:
{'device1': {'ip': '10.3.21.5',
             'name': 'device1',
             'os-type': 'ios',
             'password': 'pass1',
             'username': 'user1'},
 'device2': {'ip': '10.3.21.6',
             'name': 'device2',
             'os-type': 'ios',
             'password': 'pass2',
             'username': 'user2'},
 'device3': {'ip': '10.3.21.7',
             'name': 'device3',
             'os-type': 'nx-os',
             'password': 'pass3',
             'username': 'user3'},
 'device4': {'ip': '10.3.21.8',
             'name': 'device4',
             'os-type': 'nx-os',
             'password': 'pass4',
             'username': 'user4'},
 'device5': {'ip': '10.3.21.9',
             'name': 'device5',
             'os-type': 'ios-xr',
             'password': 'pass5',
             'username': 'user5'},
 'device6': {'ip': '10.3.21.10',
```

PART 6

Open **Visual Studio Code**, create a new file and save it with a filename of **using-lists-and-dictionaries-part-6.py**. Ensuring to save the file in the **~/labs/prne/** directory, as otherwise the code will require modification to find the associated files that are used. This python application will read multiple device information from the file, and display the items from the file into a dictionary comprised of dictionaries, based on the OS type for each device.

STEP 1: IMPORT PPRINT

Import the pprint function to enable displaying the list nicely formatted.

```
# Import required modules/packages/library
from pprint import pprint
```

STEP 2: CREATE EMPTY DICTIONARY AND LISTS

Create an empty dictionary called devices to be the outer dictionary and empty lists for each device type.

```
# For simplicity we will create our outer dictionary and lists
devices = {}  # Create the outer dictionary for all OS-types
devices['ios'] = []     # Create initial empty list of devices
devices['nx-os'] = []   # Create initial empty list of devices
devices['ios-xr'] = []  # Create initial empty list of devices
```

STEP 3: OPEN FILE FOR READING

Open the file **devices-04.txt** for reading the information one line at a time. Put the information for each device into a list.

```
# Open the file and read the list of device info
file = open('devices-04.txt', 'r')
for line in file:

    # Get device info into list
    device info list = line.strip().split(',')
```

STEP 4: CREATE DICTIONARY FOR EACH DEVICE

For each device, take the device information and put it into a dictionary.

```
    # Put device information into dictionary for this one device
    device_info = {}  # Create the inner dictionary of device info
    device_info['name'] = device_info_list[0]
    device_info['os-type'] = device_info_list[1]
    device_info['ip'] = device_info_list[2]
    device_info['username'] = device_info_list[3]
    device_info['password'] = device_info_list[4]
```

STEP 5: DISPLAY CONTENTS

Display the contents of the file that was read in and what has been built so far.

```
    # Display what we have read and built so far
    print('Read device information: ', device_info)
```

STEP 6: CREATE LIST

For each device, take the device information dictionary you have created and put the dictionary into the OS list within the outer device dictionary.

```
    # Now place our device and its info onto the correct list of devices,
    # in our main OS-type dictionary, based on the device's OS-type.
    devices[device_info['os-type']].append(device_info)
```

STEP 7: DISPLAY THE DICTIONARY

Display in the terminal the dictionary nicely formatted.

```
# Display a blank line to make easier to read
print('')

# Display a title
print('Input converted to a dictionary with OS sorting:')

# Display the dictionary with nice formatting
pprint(devices)
```

STEP 8: CLOSE FILE

Close the file.

```
# Close the file
file.close()
```

STEP 9: SAVE, RUN AND VERIFY APPLICATION

Save you application and then run it from the terminal rather than from within visual studio code.

```
~/labs/prne$ python3 using-lists-and-dictionaries-part-6.py
```

The output from your application will be displayed in your terminal window, verify that it is comparable to below.

```
devasc@labvm:~/labs/prne$ python3 using-lists-and-dictionaries-part-6.py
Read device infromation:  {'name': 'device1', 'os-type': 'ios', 'ip': '10.3.21.5', 'username': 'user1', 'password': 'pass1'}
Read device infromation:  {'name': 'device2', 'os-type': 'ios', 'ip': '10.3.21.6', 'username': 'user2', 'password': 'pass2'}
Read device infromation:  {'name': 'device3', 'os-type': 'nx-os', 'ip': '10.3.21.7', 'username': 'user3', 'password': 'pass3'}
Read device infromation:  {'name': 'device4', 'os-type': 'nx-os', 'ip': '10.3.21.8', 'username': 'user4', 'password': 'pass4'}
Read device infromation:  {'name': 'device5', 'os-type': 'ios-xr', 'ip': '10.3.21.9', 'username': 'user5', 'password': 'pass5'}
Read device infromation:  {'name': 'device6', 'os-type': 'ios-xr', 'ip': '10.3.21.10', 'username': 'user6', 'password': 'pass6'}

Input converted to a dictionary with OS sorting:
{'ios': [{'ip': '10.3.21.5',
          'name': 'device1',
          'os-type': 'ios',
          'password': 'pass1',
          'username': 'user1'},
         {'ip': '10.3.21.6',
          'name': 'device2',
          'os-type': 'ios',
          'password': 'pass2',
          'username': 'user2'}],
 'ios-xr': [{'ip': '10.3.21.9',
             'name': 'device5',
             'os-type': 'ios-xr',
             'password': 'pass5',
             'username': 'user5'},
            {'ip': '10.3.21.10',
             'name': 'device6',
             'os-type': 'ios-xr',
             'password': 'pass6',
             'username': 'user6'}],
 'nx-os': [{'ip': '10.3.21.7',
            'name': 'device3',
```

PART 7 (OPTIONAL BUT HIGHLY RECOMMENDED)

As this lab is completed in NETLAB+ and your code files will be erased when the reservation ends, it is advisable to save your files in GitHub under your repository for this course.