Python Fundamentals Project

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PROJECT OBJECTIVES

Create automation to display the operating system information.

1 Python Scripting

1. Display the OS version – if Windows, display the Windows details; if executed on Linux, display the Linux details.
2. Display the private IP address, public IP address, and the default gateway.
3. Display the hard disk size; free and used space.
4. Display the top five (5) directories and their size.
5. Display the CPU usage; refresh every 10 seconds.

PYTHON SCRIPTING

Modules

Script

```
#import all the necessary modules required
import os
import platform
import netifaces as ni
import public_ip as ip
import shutil
import psutil
import time
```

These are the modules that are required to obtain the project objectives
OS - functions to interact with the operating system
Platform - contains information of the system hardware
Netifaces - get access to a list of the network interfaces on the local machine, and to obtain the addresses of those network interfaces
Public_ip - function to get local machine's public IP address
Shutil - offers high-level operations on files and collections of files
Psutil - to retrieve information on running processes and system utilization
Time - provide ways of representing time in code

PYTHON SCRIPTING

1. Display the OS version

Script

```
# 1.Display the OS version
print('1.Display the OS version.')
print('OS Version:' ,platform.platform())
```

Returns a single string containing as much useful information that is to be retrievable about the system in human readable format

Output

```
1.Display the OS version.
OS Version: Linux-6.1.0-kali9-amd64-x86_64-with-glibc2.36
```

PYTHON SCRIPTING

2. Display the private IP address, public IP address, and the default gateway.

Script

```
# 2.Display the private IP address, public IP address, and the default gateway.
print('2.Display the private IP address, public IP address, and the default gateway.')
privateip = ni.ifaddresses('eth0')[ni.AF_INET][0]['addr']
print('Private IP Address:',privateip)

print('Public IP Address:',ip.get())

print('Default Gateway:' , ni.gateways()[ni.AF_INET][0][0])
```

Output

```
2.Display the private IP address, public IP address, and the default gateway.
Private IP Address: 192.168.254.129
Public IP Address: 220.255.105.119
Default Gateway: 192.168.254.2
```

Command for Private IP address

```
privateip = ni.ifaddresses('eth0')[ni.AF_INET][0]['addr']
print('Private IP Address:',privateip)
```

ni: used as an alias to call out the 'netifaces' module

Provides the addresses of a particular interface, in this case 'eth0'

```
>>> ni.ifaddresses('eth0')[ni.AF_INET]
[{'addr': '192.168.254.129', 'netmask': '255.255.255.0
', 'broadcast': '192.168.254.255'}]
```

Grabs the value of the key ('addr')

```
>>> ni.ifaddresses('eth0')[ni.AF_INET][0]['addr']
'192.168.254.129'
```

PYTHON SCRIPTING

2. Display the private IP address, public IP address, and the default gateway.

Command for Public IP address

```
print('Public IP Address:',ip.get())
```

ip: used as an alias to call out the 'public-ip' module
get(): function in public-ip module that gives the local machine's public IP Address

Command for Default Gateway

```
print('Default Gateway:' , ni.gateways()[ni.AF_INET][0][0])
```

Provides the default gateways

```
>>> ni.gateways()[ni.AF_INET]
[('192.168.254.2', 'eth0', True)]
```

Grabs the first element of the first list as python follows a zero-index rule

```
>>> ni.gateways()[ni.AF_INET][0][0]
'192.168.254.2'
```

PYTHON SCRIPTING

3. Display the hard disk size; free and used space.

Script

```
# 3.Display the hard disk size; free and used space.
print('3.Display the hard disk size; free and used space.')
total, used, free = shutil.disk_usage("/")   #indicates the path for disk usage statistics

# print the disk usage statistics
print('Total:', total/(10**9), 'GB')
print('Used:', used/(10**9), 'GB')
print('Free:', free/(10**9) ,'GB')
```

Output

```
3.Display the hard disk size; free and used space.
Total: 84.053143552 GB
Used: 17.613950976 GB
Free: 62.122471424 GB
```

shutil.disk_usage('path'): used to retrieve disk usage statistics for a given path. It returns a named tuple containing the total, used and free disk space available for the provided directory.

The disk usage statistics are then divided by 10^9 to get the disk usage in GB.

PYTHON SCRIPTING

4. Display the top five (5) directories and their size.

Script

```
# 4.Display the top five (5) directories and their size.
print('4.Display the top five (5) directories and their size.')

# list files in the current working directory
files = (os.listdir(os.getcwd()))

# list files in the current working directory and sorted by size (largest to smallest)
files.sort(key=lambda f: os.stat(f).st_size, reverse=True)

# list the largest 5 directories/files
top5=files[:5]

#names and print the largest 5 directories/files along with their size
for name_of_file in top5:
    path_of_file = os.path.join(os.getcwd(), name_of_file)
    size_of_file  = os.stat(path_of_file).st_size
    print(size_of_file,'bytes -->', name_of_file)
```

files: used as a variable to store the list of directories and files in the current working directory (cwd)
files.sort(key=lambda f: os.stat(f).st_size, reverse=True): sorts the files in cwd based on its file size (from largest to smallest)
files[:5]: list the top five files in the list
os.path.join(os.getcwd(),name_of_file): concatenates the path components with the appropriate operating system separator, resulting in a string that represents a path to the user's documents directory
os.stat(path_of_file).st_size: provides the size of the file

Output

```
4.Display the top five (5) directories and their size.
61366 bytes --> .zsh_history
11759 bytes --> .face
11759 bytes --> .face.icon
10868 bytes --> .zshrc
6125 bytes --> .python_history
```

PYTHON SCRIPTING

5. Display the CPU usage; refresh every 10 seconds.

Script

```
# 5.Display the CPU usage; refresh every 10 seconds.
print('5.Display the CPU usage; refresh every 10 seconds.')
while True:
    print('CPU utilization:' psutil.cpu_percent(1),'%')
    time.sleep(10)
```

Run the loop infinite number of times

Adds delay in executing the command, in this case 10 seconds

Provides current system-wide CPU utilization as a percentage with interval of 1 second between calls for accuracy

Output

```
5.Display the CPU usage; refresh every 10 seconds.
CPU utilization: 6.8 %
CPU utilization: 5.2 %
CPU utilization: 6.2 %
CPU utilization: 0.8 %
CPU utilization: 1.3 %
CPU utilization: 3.3 %
CPU utilization: 1.0 %
CPU utilization: 1.0 %
CPU utilization: 1.3 %
```

OUTPUT OF THE SCRIPT

```
└─$ python3 ProjectPF.py
Student name: Michelle Lai
Student code: S23
Class code: CFC020823
Lecturer name: James

1.Display the OS version.
OS Version: Linux-6.1.0-kali9-amd64-x86_64-with-glibc2.36

2.Display the private IP address, public IP address, and the default gateway.
Private IP Address: 192.168.254.129
Public IP Address: 220.255.
Default Gateway: 192.168.254.2

3.Display the hard disk size; free and used space.
Total: 84.053143552 GB
Used: 17.60518144 GB
Free: 62.13124096 GB

4.Display the top five (5) directories and their size.
61281 bytes --> .zsh_history
11759 bytes --> .face
11759 bytes --> .face.icon
10868 bytes --> .zshrc
6125 bytes --> .python_history

5.Display the CPU usage; refresh every 10 seconds.
CPU utilization: 6.9 %
CPU utilization: 1.0 %
CPU utilization: 1.5 %
CPU utilization: 0.8 %
```

CITATIONS

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