Faculty of Engineering & Technology

Electrical & Computer Engineering Department

Linux Laboratory ENCS3130

Project#1 Report

Shell Scripting Project – Statistics of Running Processes on Linux Machine

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Introduction

The Top Statistics Project is an assembly of shell scripts tailored to dissect the system usage statistics compiled by the 'top' command in a Linux context. These scripts extend several functions to examine CPU usage, network packet delivery, and command memory usage, and comprehend how these aspects vary over time.

The Options

```
Select an option to run the top statistics project:
r) read top output file
c) average, minimum, and maximum CPU usage
i) average, minimum, and maximum received packets
o) average, minimum, and maximum sent packets
u) commands with the maximum average CPU
a) commands with the maximum average memory usage
b) commands with the minimum average memory usage
e) exit
```

Option r: Read Top Output File

This option opens and reads a file filled with 'top' command outputs, ensuring the file is both present and accessible. This acts as the backbone for the subsequent features as they all necessitate file input.

```
r
Please input the name of the file:
top.txt
File exists
Do you want to print the file content? (yes/no)
no
```

Option c: Calculate CPU Usage

This option dissects the file opened by Feature r, focusing specifically on entries indicative of CPU usage. It calculates the average, least, and most CPU usage across the entirety of the file.

```
c
Please input the name of the file:
top.txt
File exists
Do you want to print the file content? (yes/no)
no
Average CPU usage: 2.82%
Maximum CPU usage: 3.93%
Minimum CPU usage: 1.98%
```

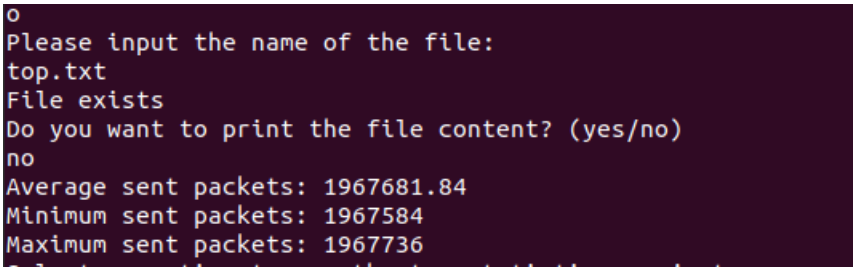
Option i: Calculate Received Packets

This option computes the average, least, and most received network packets. The script filters the data from the file input and processes calculations to present a summary of received packet statistics.

```
i
Please input the name of the file:
top.txt
File exists
Do you want to print the file content? (yes/no)
no
Average received packets: 3760726.38
Maximum received packets: 3760827
Minimum received packets: 3760418
```

Option o: Calculate Sent Packets

This option computes the average, least, and most sent network packets. The script filters the data from the file and processes calculations to present a summary of sent packet statistics.



Option u: Commands with the Maximum Average CPU

This option uncovers the top 'm' commands with the greatest average CPU usage, where 'm' denotes a user-defined integer. It uses the file input to collate all executed commands and compute their average CPU usage.

For invalid integer:

```
Select an option to run the top statistics project:
r) read top output file
c) average, minimum, and maximum CPU usage
i) average, minimum, and maximum received packets
o) average, minimum, and maximum sent packets
u) commands with the maximum average CPU
a) commands with the maximum average memory usage
b) commands with the minimum average memory usage
e) exit
u
Please enter an integer: m
Invalid input
```

For m =3:

```
Select an option to run the top statistics project:
r) read top output file
c) average, minimum, and maximum CPU usage
i) average, minimum, and maximum received packets
o) average, minimum, and maximum sent packets
u) commands with the maximum average CPU
a) commands with the maximum average memory usage
b) commands with the minimum average memory usage
e) exit
u
Please enter an integer: 3
**************************************************
 1677  Google Chrome He  17.4
 593  Google Chrome He  16.9
 593  Google Chrome He  16.8
**************************************************
```

For m=20:

```
Select an option to run the top statistics project:
r) read top output file
c) average, minimum, and maximum CPU usage
i) average, minimum, and maximum received packets
o) average, minimum, and maximum sent packets
u) commands with the maximum average CPU
a) commands with the maximum average memory usage
b) commands with the minimum average memory usage
e) exit
u
Please enter an integer: 20
**************************************************
 1677  Google Chrome He  17.4
 593  Google Chrome He  16.9
 593  Google Chrome He  16.8
 593  Google Chrome He  16.7
 593  Google Chrome He  16.6
 593  Google Chrome He  16.5
 593  Google Chrome He  16.5
 593  Google Chrome He  16.1
 483  Finder  15.4
 483  Finder  14.8
 593  Google Chrome He  14.7
 593  Google Chrome He  14.4
 593  Google Chrome He  14.4
 158  WindowServer  11.2
 416  Google Chrome  11.0
 416  Google Chrome  11.0
 158  WindowServer  11.0
 416  Google Chrome  10.9
 416  Google Chrome  10.9
 158  WindowServer  10.9
**************************************************
```

Option a: Commands with the Maximum Average Memory Usage

This option uncovers the top 'm' commands with the greatest average memory usage. Similar to Feature u, 'm' signifies a user-defined integer. It calculates the average memory usage for all commands identified in the input file.

For invalid integer:

```
Select an option to run the top statistics project:
r) read top output file
c) average, minimum, and maximum CPU usage
i) average, minimum, and maximum received packets
o) average, minimum, and maximum sent packets
u) commands with the maximum average CPU
a) commands with the maximum average memory usage
b) commands with the minimum average memory usage
e) exit
a
Please enter an integer: m
Invalid input
```

For m =3:

```
Select an option to run the top statistics project:
r) read top output file
c) average, minimum, and maximum CPU usage
i) average, minimum, and maximum received packets
o) average, minimum, and maximum sent packets
u) commands with the maximum average CPU
a) commands with the maximum average memory usage
b) commands with the minimum average memory usage
e) exit
a
Please enter an integer: 3
*****************************************************
 71442  Google Drive     2147483647
 71442  Google Drive     2147483647
 71442  Google Drive     2147483647
*****************************************************
```

For m=20:

```
Select an option to run the top statistics project:
r) read top output file
c) average, minimum, and maximum CPU usage
i) average, minimum, and maximum received packets
o) average, minimum, and maximum sent packets
u) commands with the maximum average CPU
a) commands with the maximum average memory usage
b) commands with the minimum average memory usage
e) exit
a
Please enter an integer: 20
*****************************************************
 71442  Google Drive     2147483647
 71442  Google Drive     2147483647
 71442  Google Drive     2147483647
 158  WindowServer       1797259264
 158  WindowServer       1797259264
 158  WindowServer       1797259264
 158  WindowServer       1795162112
 158  WindowServer       1795162112
 158  WindowServer       1795162112
 158  WindowServer       1795162112
 158  WindowServer       1795162112
 158  WindowServer       1795162112
 158  WindowServer       1795162112
 35938  Microsoft Outloo         488636416
 416  Google Chrome      368050176
 416  Google Chrome      368050176
 416  Google Chrome      368050176
 416  Google Chrome      368050176
 416  Google Chrome      368050176
 416  Google Chrome      368050176
*****************************************************
```

Option b: Commands with the Minimum Average Memory Usage

This option uncovers the top 'm' commands with the smallest average memory usage. Like the previous features, 'm' denotes a user-defined integer. It computes the average memory usage for all commands discovered in the input file but arranges them in ascending order to determine the commands with the least memory usage.

For Invalid input:

```
Select an option to run the top statistics project:
r) read top output file
c) average, minimum, and maximum CPU usage
i) average, minimum, and maximum received packets
o) average, minimum, and maximum sent packets
u) commands with the maximum average CPU
a) commands with the maximum average memory usage
b) commands with the minimum average memory usage
e) exit
b
Please enter an integer: h
Invalid input
```

For m=3:

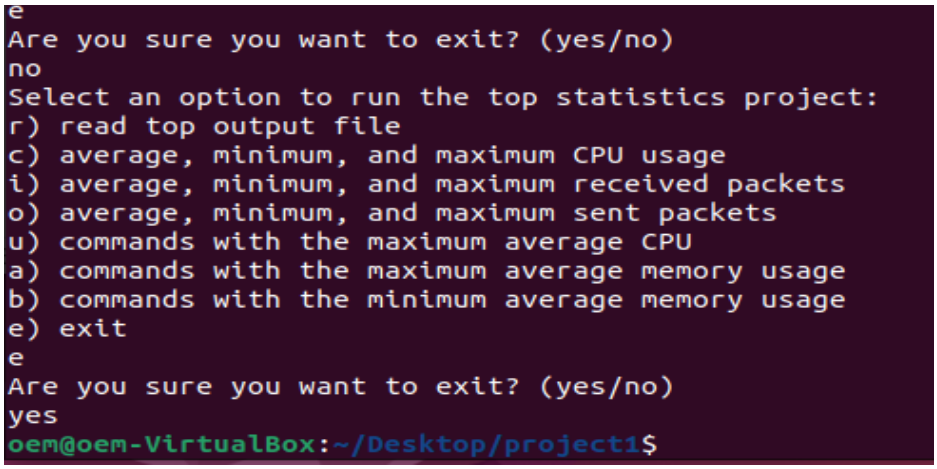
```
Select an option to run the top statistics project:
r) read top output file
c) average, minimum, and maximum CPU usage
i) average, minimum, and maximum received packets
o) average, minimum, and maximum sent packets
u) commands with the maximum average CPU
a) commands with the maximum average memory usage
b) commands with the minimum average memory usage
e) exit
b
Please enter an integer: 3
*****************************************************
 74332  com.apple.ColorS         626688
 74332  com.apple.ColorS         626688
 74332  com.apple.ColorS         626688
*****************************************************
```

For m=20:

```
Select an option to run the top statistics project:
r) read top output file
c) average, minimum, and maximum CPU usage
i) average, minimum, and maximum received packets
o) average, minimum, and maximum sent packets
u) commands with the maximum average CPU
a) commands with the maximum average memory usage
b) commands with the minimum average memory usage
e) exit
b
Please enter an integer: 20
*****************************************************
 74332  com.apple.ColorS         626688
 74332  com.apple.ColorS         626688
 74332  com.apple.ColorS         626688
 74344  mdworker_shared          1277952
 74341  mdworker_shared          1310720
 74346  mdworker_shared          1310720
 74343  mdworker_shared          1327104
 74329  mdworker_shared          1343488
 74342  mdworker_shared          1380352
 74323  mdworker_shared          1392640
 74323  mdworker_shared          1400832
 74343  mdworker_shared          1425408
 74297  exchangesyncd    1830912
 74331  cupsd    2375680
 74331  cupsd    2375680
 74331  cupsd    2375680
 101  powerd     3067904
 74330  printtool        3145728
 74330  printtool        3145728
 74330  printtool        3145728
*****************************************************
```

Option e: Exit

This option gently concludes the script execution. When chosen, the script seeks user confirmation to ensure the exit was intended. If the user verifies with a 'yes', the script concludes, otherwise, it reverts to the menu. Screenshots and a comprehensive explanation of the execution are provided.



In summary, these features offer a thorough analysis of system usage. They are beneficial for monitoring resource usage over time, pinpointing potential performance constraints, and fine-tuning system operations.