Schluet

Asignment

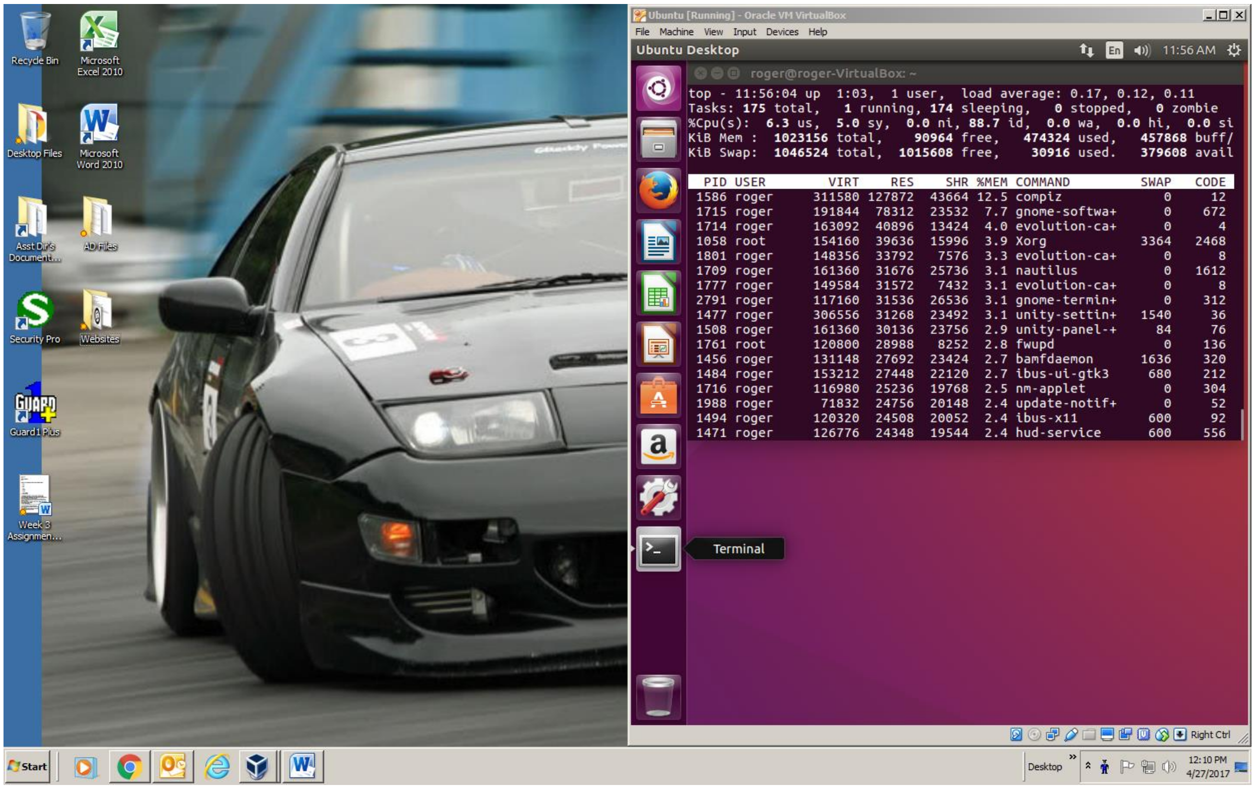
Analyzing Virtual Memory

4-27-17

I configured the top command so that the following fields were displayed in the output:

- PID
- USER
- VIRT
- RES
- SHR
- %MEM
- SWAP
- CODE
- DATA COMMAND

I sorted the output by %MEM



```
top - 11:56:04 up  1:03,  1 user,  load average: 0.17, 0.12, 0.11
Tasks: 175 total,   1 running, 174 sleeping,   0 stopped,   0 zombie
%Cpu(s):  6.3 us,  5.0 sy,  0.0 ni, 88.7 id,  0.0 wa,  0.0 hi,  0.0 si
KiB Mem :  1023156 total,    90964 free,   474324 used,   457868 buff/
KiB Swap:  1046524 total,  1015608 free,    30916 used.   379608 avail

  PID USER       VIRT    RES    SHR %MEM COMMAND          SWAP   CODE
 1586 roger    311580 127872  43664 12.5 compiz              0     12
 1715 roger    191844  78312  23532  7.7 gnome-softwa+       0    672
 1714 roger    163092  40896  13424  4.0 evolution-ca+       0      4
 1058 root     154160  39636  15996  3.9 Xorg             3364   2468
 1801 roger    148356  33792   7576  3.3 evolution-ca+       0      8
 1709 roger    161360  31676  25736  3.1 nautilus            0   1612
 1777 roger    149584  31572   7432  3.1 evolution-ca+       0      8
 2791 roger    117160  31536  26536  3.1 gnome-termin+       0    312
 1477 roger    306556  31268  23492  3.1 unity-settin+    1540     36
 1508 roger    161360  30136  23756  2.9 unity-panel-+      84     76
 1761 root     120800  28988   8252  2.8 fwupd               0    136
 1456 roger    131148  27692  23424  2.7 bamfdaemon       1636    320
 1484 roger    153212  27448  22120  2.7 ibus-ui-gtk3      680    212
 1716 roger    116980  25236  19768  2.5 nm-applet           0    304
 1988 roger     71832  24756  20148  2.4 update-notif+       0     52
 1494 roger    120320  24508  20052  2.4 ibus-x11          600     92
 1471 roger    126776  24348  19544  2.4 hud-service       600    556
```

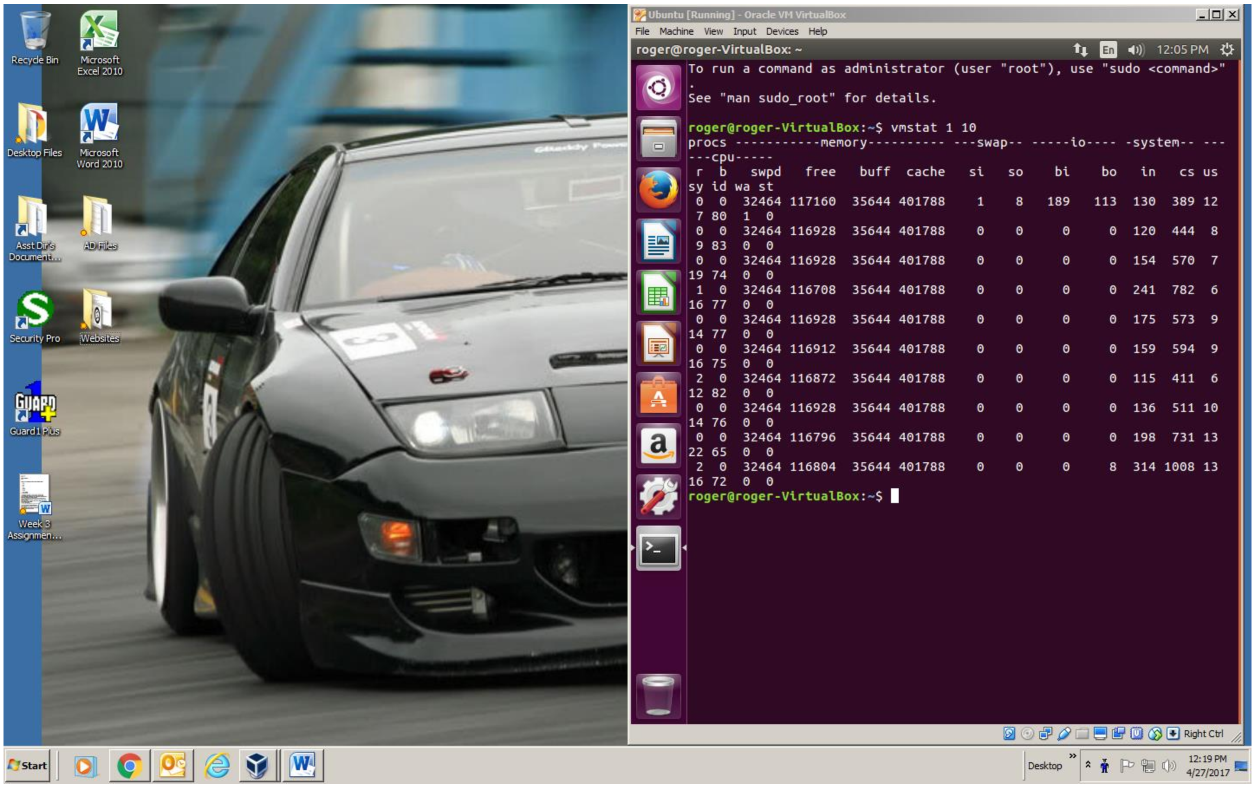
1) Explain the output from the entire line that starts with Mem: at the top of the Screen.

2) Explain the output from the entire line that starts with Swap: at the top of the Screen.

3) For the topmost process (If sorted correctly, this will be the one using the most memory) – give the data values and the meaning behind the value in each column.

4) For the process from #3 above, describe the relationship between the values reported in the “VIRT” “RES” and “SWAP” columns. Does this relationship indicate LINUX may be using demand paging? Why or why not?

Using the vmstat command, I ran the command so that the virtual memory statistics are captured once per second with a total of 10 samples.



```
To run a command as administrator (user "root"), use "sudo <command>"
.
See "man sudo_root" for details.

roger@roger-VirtualBox:~$ vmstat 1 10
procs -----------memory---------- ---swap-- -----io---- -system-- ---
---cpu-----
 r  b   swpd   free   buff  cache   si   so    bi    bo   in   cs us
sy id wa st
 0  0  32464 117160  35644 401788    1    8   189   113  130  389 12
 7 80  1  0
 0  0  32464 116928  35644 401788    0    0     0     0  120  444  8
 9 83  0  0
 0  0  32464 116928  35644 401788    0    0     0     0  154  570  7
19 74  0  0
 1  0  32464 116708  35644 401788    0    0     0     0  241  782  6
16 77  0  0
 0  0  32464 116928  35644 401788    0    0     0     0  175  573  9
14 77  0  0
 0  0  32464 116912  35644 401788    0    0     0     0  159  594  9
16 75  0  0
 2  0  32464 116872  35644 401788    0    0     0     0  115  411  6
12 82  0  0
 0  0  32464 116928  35644 401788    0    0     0     0  136  511 10
14 76  0  0
 0  0  32464 116796  35644 401788    0    0     0     0  198  731 13
22 65  0  0
 2  0  32464 116804  35644 401788    0    0     0     8  314 1008 13
16 72  0  0
roger@roger-VirtualBox:~$
```

5) What was the command used?

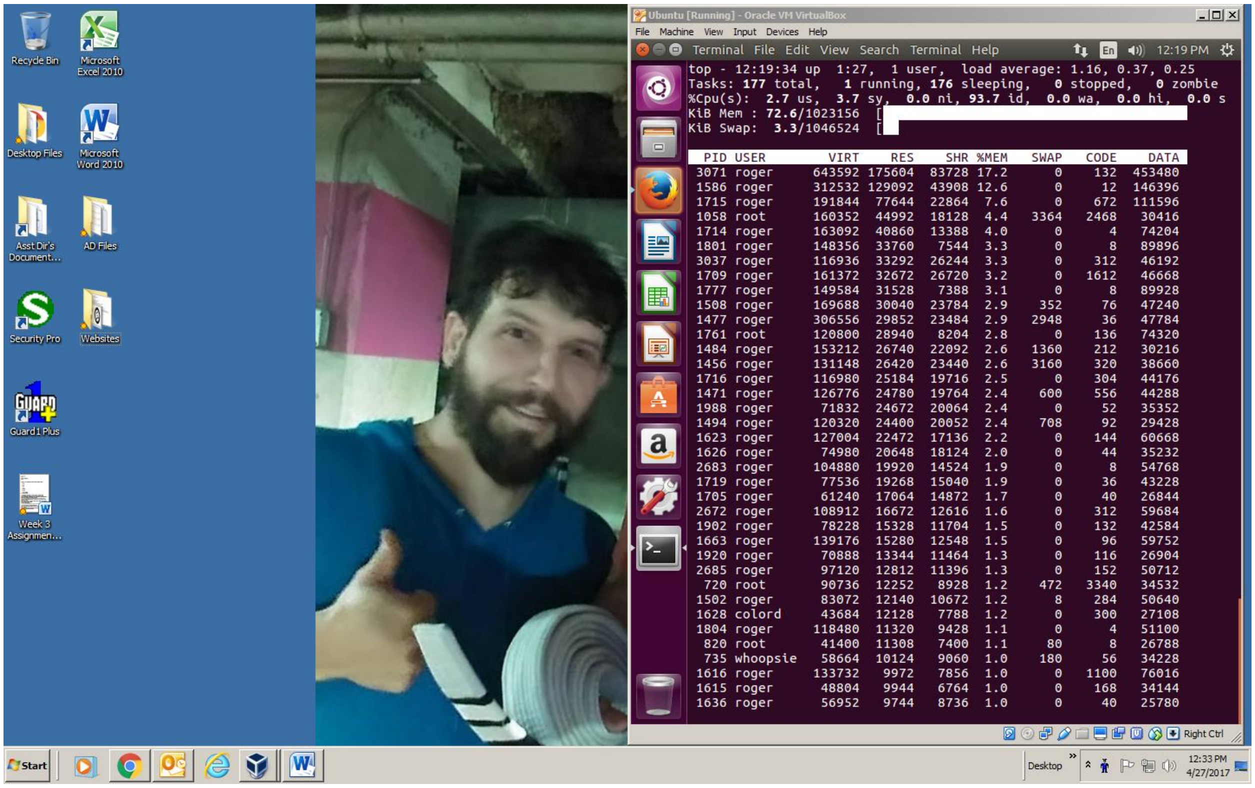
6) What is average value of the “swpd” field and what does that mean?

7) What is the size of the “free” list and what does that mean?

8) Out of the 10 seconds sampled, how many of them had swapping activity? How can you tell and what was the activity?

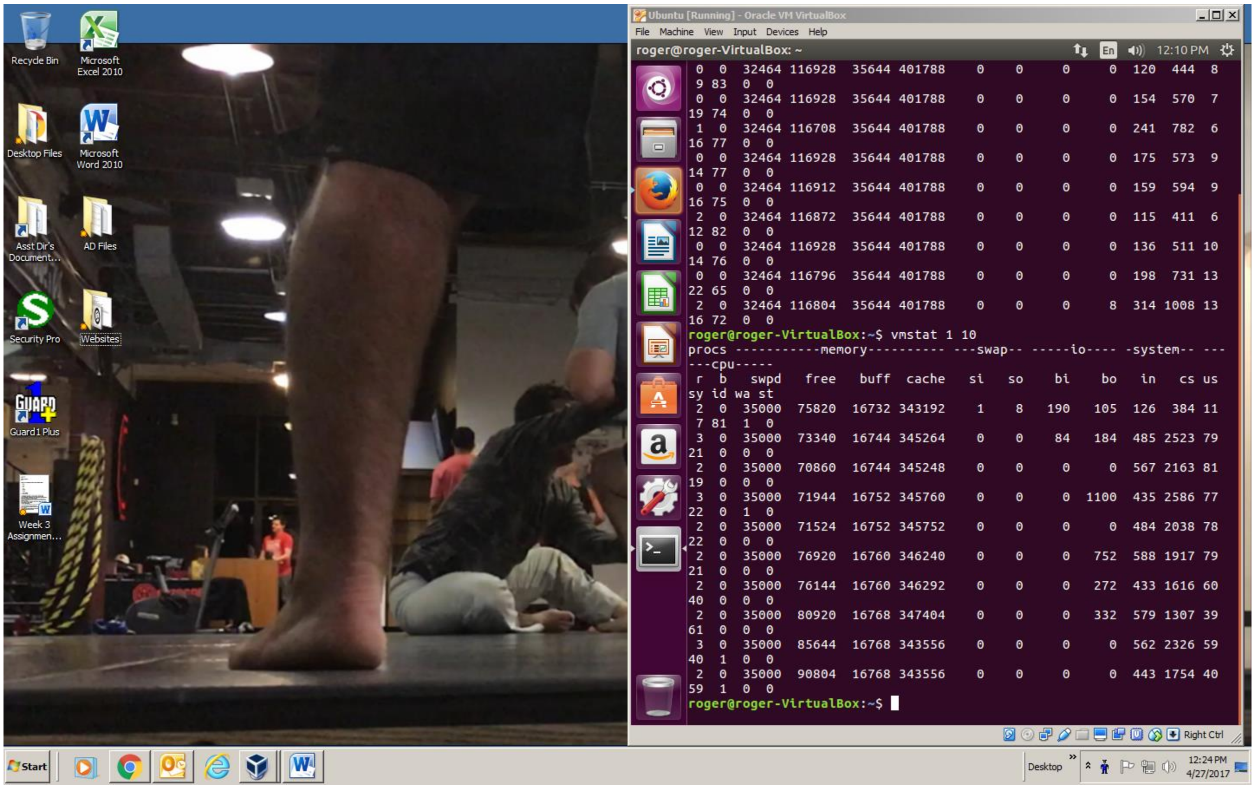
9) Do the values in your findings above indicate any kind of performance problem such as thrashing or the need for more physical memory? Explain.

I opened up several applications and left them opened while I recorded new values.



```
top - 12:19:34 up  1:27,  1 user,  load average: 1.16, 0.37, 0.25
Tasks: 177 total,   1 running, 176 sleeping,   0 stopped,   0 zombie
%Cpu(s):  2.7 us,  3.7 sy,  0.0 ni, 93.7 id,  0.0 wa,  0.0 hi,  0.0 s
KiB Mem : 72.6/1023156  [
KiB Swap:  3.3/1046524  [

  PID USER          VIRT    RES    SHR %MEM    SWAP   CODE    DATA
 3071 roger       643592 175604  83728 17.2       0    132  453480
 1586 roger       312532 129092  43908 12.6       0     12  146396
 1715 roger       191844  77644  22864  7.6       0    672  111596
 1058 root        160352  44992  18128  4.4    3364   2468   30416
 1714 roger       163092  40860  13388  4.0       0      4   74204
 1801 roger       148356  33760   7544  3.3       0      8   89896
 3037 roger       116936  33292  26244  3.3       0    312   46192
 1709 roger       161372  32672  26720  3.2       0   1612   46668
 1777 roger       149584  31528   7388  3.1       0      8   89928
 1508 roger       169688  30040  23784  2.9     352     76   47240
 1477 roger       306556  29852  23484  2.9    2948     36   47784
 1761 root        120800  28940   8204  2.8       0    136   74320
 1484 roger       153212  26740  22092  2.6    1360    212   30216
 1456 roger       131148  26420  23440  2.6    3160    320   38660
 1716 roger       116980  25184  19716  2.5       0    304   44176
 1471 roger       126776  24780  19764  2.4     600    556   44288
 1988 roger        71832  24672  20064  2.4       0     52   35352
 1494 roger       120320  24400  20052  2.4     708     92   29428
 1623 roger       127004  22472  17136  2.2       0    144   60668
 1626 roger        74980  20648  18124  2.0       0     44   35232
 2683 roger       104880  19920  14524  1.9       0      8   54768
 1719 roger        77536  19268  15040  1.9       0     36   43228
 1705 roger        61240  17064  14872  1.7       0     40   26844
 2672 roger       108912  16672  12616  1.6       0    312   59684
 1902 roger        78228  15328  11704  1.5       0    132   42584
 1663 roger       139176  15280  12548  1.5       0     96   59752
 1920 roger        70888  13344  11464  1.3       0    116   26904
 2685 roger        97120  12812  11396  1.3       0    152   50712
  720 root         90736  12252   8928  1.2     472   3340   34532
 1502 roger        83072  12140  10672  1.2       8    284   50640
 1628 colord       43684  12128   7788  1.2       0    300   27108
 1804 roger       118480  11320   9428  1.1       0      4   51100
  820 root         41400  11308   7400  1.1      80      8   26788
  735 whoopsie     58664  10124   9060  1.0     180     56   34228
 1616 roger       133732   9972   7856  1.0       0   1100   76016
 1615 roger        48804   9944   6764  1.0       0    168   34144
 1636 roger        56952   9744   8736  1.0       0     40   25780
```



```
 0  0  32464 116928  35644 401788    0    0     0     0 120  444  8
 9 83  0  0
 0  0  32464 116928  35644 401788    0    0     0     0 154  570  7
19 74  0  0
 1  0  32464 116708  35644 401788    0    0     0     0 241  782  6
16 77  0  0
 0  0  32464 116928  35644 401788    0    0     0     0 175  573  9
14 77  0  0
 0  0  32464 116912  35644 401788    0    0     0     0 159  594  9
16 75  0  0
 2  0  32464 116872  35644 401788    0    0     0     0 115  411  6
12 82  0  0
 0  0  32464 116928  35644 401788    0    0     0     0 136  511 10
14 76  0  0
 0  0  32464 116796  35644 401788    0    0     0     0 198  731 13
22 65  0  0
 2  0  32464 116804  35644 401788    0    0     0     8 314 1008 13
16 72  0  0
roger@roger-VirtualBox:~$ vmstat 1 10
procs -----------memory---------- ---swap-- -----io---- -system-- ---
---cpu-----
 r  b   swpd   free   buff  cache   si   so    bi    bo   in   cs us
sy id wa st
 2  0  35000  75820  16732 343192    1    8   190   105  126  384 11
 7 81  1  0
 3  0  35000  73340  16744 345264    0    0    84   184  485 2523 79
21  0  0  0
 2  0  35000  70860  16744 345248    0    0     0     0  567 2163 81
19  0  0  0
 3  0  35000  71944  16752 345760    0    0     0  1100  435 2586 77
22  0  1  0
 2  0  35000  71524  16752 345752    0    0     0     0  484 2038 78
22  0  0  0
 2  0  35000  76920  16760 346240    0    0     0   752  588 1917 79
21  0  0  0
 2  0  35000  76144  16760 346292    0    0     0   272  433 1616 60
40  0  0  0
 2  0  35000  80920  16768 347404    0    0     0   332  579 1307 39
61  0  0  0
 3  0  35000  85644  16768 343556    0    0     0     0  562 2326 59
40  1  0  0
 2  0  35000  90804  16768 343556    0    0     0     0  443 1754 40
59  1  0  0
roger@roger-VirtualBox:~$
```

10) Document before and after values and create a summary documenting the changes you noticed (i.e. The effect of running applications on performance as verified through your performance analysis). Make a recommendation to add resources or change system parameters as necessary to increase performance under heavy loads. Be sure to use your data values to back up your recommendation(s) if any.