

## **PRACTICAL ACTIVITY 3: ON LINUX SYSTEM ADMINISTRATION**

### **Part 1: of Practical Activity Week 3**

This week you will entirely learn how to manage and access different processes and statistics in a Linux environment.

Perform the following activities and screenshot your output from Ubuntu- Terminal.

Do through research for the different commands you will utilize.

1. List the processes for the current shell. - ps
2. Display information about processes. – ps -A or ps aux
3. Display the global priority of a process and find out the column that provides. Top under pr. (or: ps -o pri -p processno. Or -e to list all)
4. Change the priority of a process with default arguments. -sudo renice -new prio -pid
5. Display Virtual Memory Statistics. – cat /proc/meminfo vmstat -s
6. Display System Event Information. -direvent -V or usage dmesg can add less to it
7. Display Swapping Statistics. Swapon -s or proc/swaps
8. Check File Access statistics. Stat -f /
9. Check Buffer Activity statistics. Sar -b
10. Check Disk Activity statistics. Dstat -d
11. Check Inter process Communication statistics. Ipc -b
12. Check Unused Memory in the server. Free -m
13. Check Swap Activities. Grep Swap /proc/meminfo

### **Part 2 : Practical Activity Week 3**

This exercise is based on management of users accounts and creating of files. As linux security Administrator you should be able to assign different file permission and revoke permissions to unauthorized users. To improve your skills practice with this exercise.

**Entirely use the Terminal utilization of GUI will not be awarded any marks.**

Login to your terminal in Ubuntu.

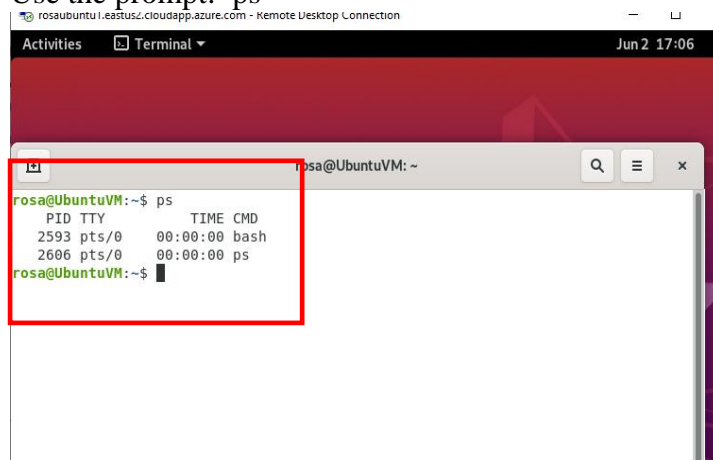
1. Create a user account called user1 and another user2
2. Ensure user1 and user2 are password protected.
3. Logout and login as user1
4. Create a testdir
5. Create a file testfile in testdir
6. Verify the ownership and the group of the testfile
7. Switch to Superuser account
8. Create a public directory dir1
9. Set stickybit (save text attribute) on dir1
10. Logout and login as a normal user user1
11. Create a file userfile1 in dir1
12. Login as a different user user2
13. Try to edit or remove the file

14. Temporarily disable user logins : `sudo passwd -l user` to undo `passwd -u`

## PART 1 – COMMANDS

1. List the processes for the current shell.

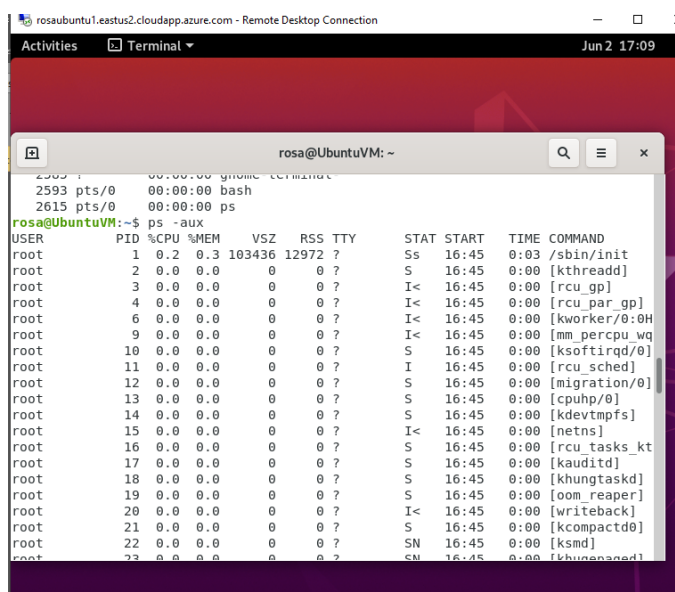
Use the prompt: `ps`



A terminal window titled 'rosabuntu1.eastus2.cloudapp.azure.com - Remote Desktop Connection' showing the output of the `ps` command. The output is a table with columns: PID, TTY, pts/0, TIME, and CMD. The processes listed are `bash` (PID 2593) and `ps` (PID 2606). The prompt is `rosabuntuVM:~$`.

```
rosabuntuVM:~$ ps
  PID TTY          pts/0    TIME CMD
 2593 pts/0    00:00:00 bash
 2606 pts/0    00:00:00 ps
rosabuntuVM:~$
```

2. Display information about processes: `ps -A` or `ps aux`



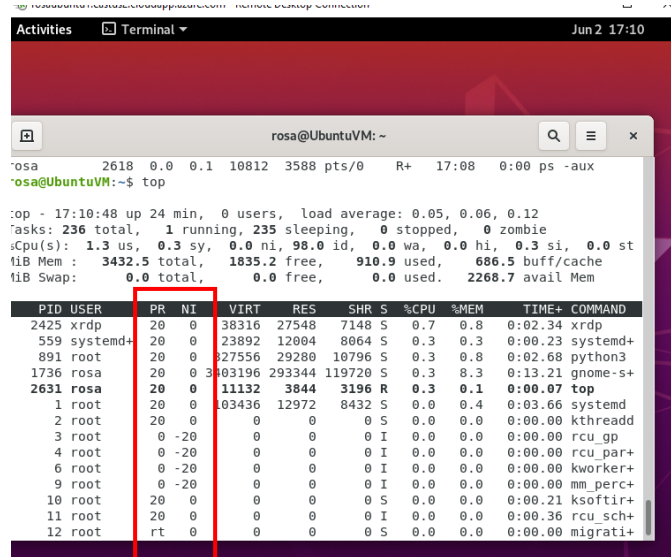
A terminal window titled 'rosabuntu1.eastus2.cloudapp.azure.com - Remote Desktop Connection' showing the output of the `ps -aux` command. The output is a detailed table with columns: USER, PID, %CPU, %MEM, VSZ, RSS, TTY, STAT, START, TIME, and COMMAND. The processes listed include `/sbin/init`, `[kthreadd]`, `[rcu_gp]`, `[rcu_par_gp]`, `[kworker/0:0H]`, `[mm_percpu_wq]`, `[ksoftirqd/0]`, `[rcu_sched]`, `[migration/0]`, `[cpuhp/0]`, `[kdevtmpfs]`, `[netns]`, `[rcu_tasks_kt]`, `[kauditd]`, `[khungtaskd]`, `[oom_reaper]`, `[writeback]`, `[kcompactd0]`, `[ksmd]`, and `[kbugzad0]`. The prompt is `rosabuntuVM:~$`.

```
rosabuntuVM:~$ ps -aux
USER      PID  %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root         1   0.2  0.3 103436 12972 ?        Ss   16:45   0:03 /sbin/init
root         2   0.0  0.0      0     0 ?        S    16:45   0:00 [kthreadd]
root         3   0.0  0.0      0     0 ?        I<   16:45   0:00 [rcu_gp]
root         4   0.0  0.0      0     0 ?        I<   16:45   0:00 [rcu_par_gp]
root         6   0.0  0.0      0     0 ?        I<   16:45   0:00 [kworker/0:0H]
root         9   0.0  0.0      0     0 ?        I<   16:45   0:00 [mm_percpu_wq]
root        10   0.0  0.0      0     0 ?        S    16:45   0:00 [ksoftirqd/0]
root        11   0.0  0.0      0     0 ?        I    16:45   0:00 [rcu_sched]
root        12   0.0  0.0      0     0 ?        S    16:45   0:00 [migration/0]
root        13   0.0  0.0      0     0 ?        S    16:45   0:00 [cpuhp/0]
root        14   0.0  0.0      0     0 ?        S    16:45   0:00 [kdevtmpfs]
root        15   0.0  0.0      0     0 ?        I<   16:45   0:00 [netns]
root        16   0.0  0.0      0     0 ?        S    16:45   0:00 [rcu_tasks_kt]
root        17   0.0  0.0      0     0 ?        S    16:45   0:00 [kauditd]
root        18   0.0  0.0      0     0 ?        S    16:45   0:00 [khungtaskd]
root        19   0.0  0.0      0     0 ?        S    16:45   0:00 [oom_reaper]
root        20   0.0  0.0      0     0 ?        I<   16:45   0:00 [writeback]
root        21   0.0  0.0      0     0 ?        S    16:45   0:00 [kcompactd0]
root        22   0.0  0.0      0     0 ?        SN   16:45   0:00 [ksmd]
root        23   0.0  0.0      0     0 ?        S    16:45   0:00 [kbugzad0]
```

- Display the global priority of a process and find out the column that provides.

The column PR has the kernel priority (which is 20 + NI). The column NI has the actual priority.

Top – for all processes

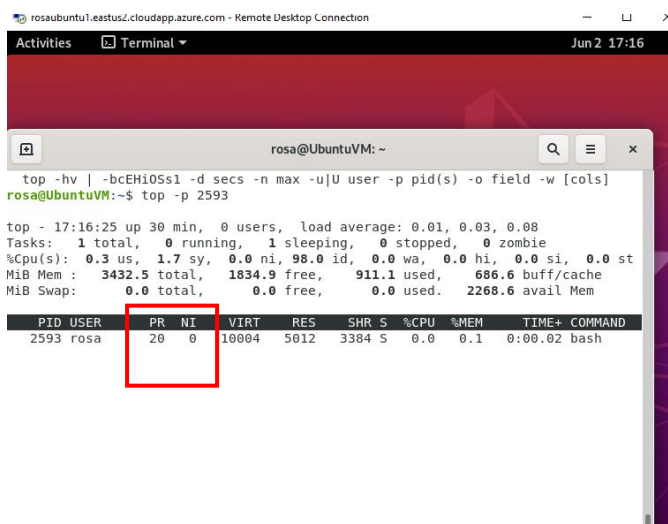


```
rosa 2618 0.0 0.1 10812 3588 pts/0 R+ 17:08 0:00 ps -aux
rosa@UbuntuVM:~$ top

top - 17:10:48 up 24 min, 0 users, load average: 0.05, 0.06, 0.12
Tasks: 236 total, 1 running, 235 sleeping, 0 stopped, 0 zombie
%Cpu(s): 1.3 us, 0.3 sy, 0.0 ni, 98.0 id, 0.0 wa, 0.0 hi, 0.3 si, 0.0 st
MiB Mem : 3432.5 total, 1835.2 free, 910.9 used, 686.5 buff/cache
MiB Swap: 0.0 total, 0.0 free, 0.0 used, 2268.7 avail Mem

  PID USER      PR  NI  VIRT  RES  SHR S %CPU  %MEM    TIME+  COMMAND
 2425 xrdp      20   0 38316 27548 7148 S  0.7   0.8   0:02.34 xrdp
 559  systemd+ 20   0 23892 12004 8064 S  0.3   0.3   0:00.23 systemd+
 891  root      20   0 27556 29280 10796 S  0.3   0.8   0:02.68 python3
1736 rosa      20   0 403196 293344 119720 S  0.3   8.3   0:13.21 gnome-s+
2631 rosa      20   0 11132 3844 3196 R  0.3   0.1   0:00.07 top
 1  root      20   0 83436 12972 8432 S  0.0   0.4   0:03.66 systemd
 2  root      20   0 0 0 0 S  0.0   0.0   0:00.00 kthreadd
 3  root      0 -20 0 0 0 I  0.0   0.0   0:00.00 rcu_gp
 4  root      0 -20 0 0 0 I  0.0   0.0   0:00.00 rcu_par+
 6  root      0 -20 0 0 0 I  0.0   0.0   0:00.00 kworker+
 9  root      0 -20 0 0 0 I  0.0   0.0   0:00.00 mm_perc+
10  root      20   0 0 0 0 S  0.0   0.0   0:00.21 ksoftir+
11  root      20   0 0 0 0 I  0.0   0.0   0:00.36 rcu_sch+
12  root      rt   0 0 0 0 S  0.0   0.0   0:00.00 migrati+
```

Top -p 2593 (for a particular process).

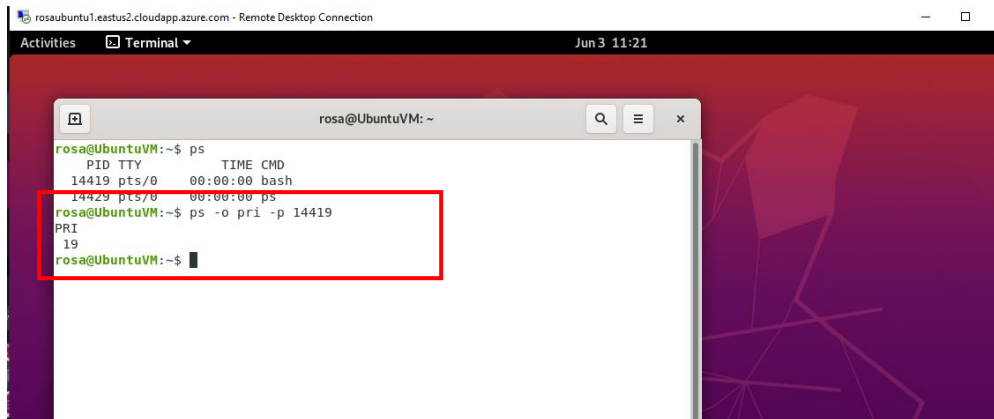


```
rosa@UbuntuVM:~$ top -p 2593

top - 17:16:25 up 30 min, 0 users, load average: 0.01, 0.03, 0.08
Tasks: 1 total, 0 running, 1 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.3 us, 1.7 sy, 0.0 ni, 98.0 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
MiB Mem : 3432.5 total, 1834.9 free, 911.1 used, 686.6 buff/cache
MiB Swap: 0.0 total, 0.0 free, 0.0 used, 2268.6 avail Mem

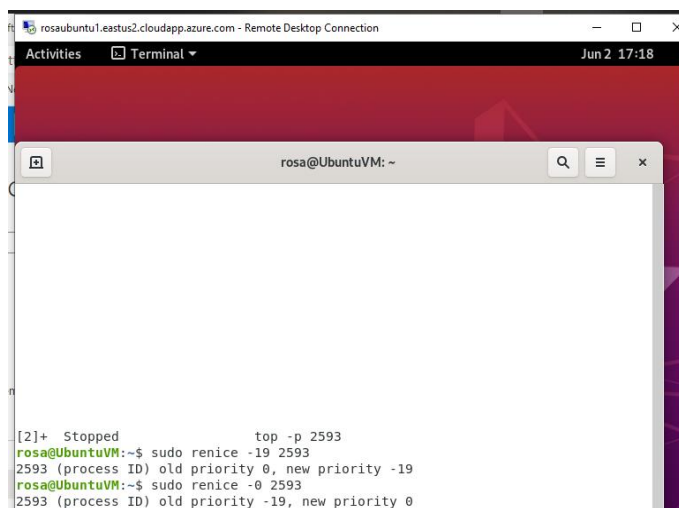
  PID USER      PR  NI  VIRT  RES  SHR S %CPU  %MEM    TIME+  COMMAND
 2593 rosa      20   0 10004 5012 3384 S  0.0   0.1   0:00.02 bash
```

Can also use `ps -o pri -p 2593` (This will give the direct priority number)

A terminal window titled 'rosa@UbuntuVM: ~' is shown within a remote desktop connection. The terminal displays the output of the 'ps' command, which lists running processes. The first line of output is '14419 pts/0 00:00:00 bash'. The second line is '14429 pts/0 00:00:00 ps'. A red rectangle highlights the second line. Below this, the command 'ps -o pri -p 14419' is entered, and the output '19' is displayed, indicating the priority of the process with PID 14419.

```
rosa@UbuntuVM:~$ ps
PID TTY          TIME CMD
14419 pts/0        00:00:00 bash
14429 pts/0        00:00:00 ps
rosa@UbuntuVM:~$ ps -o pri -p 14419
PRI
19
rosa@UbuntuVM:~$
```

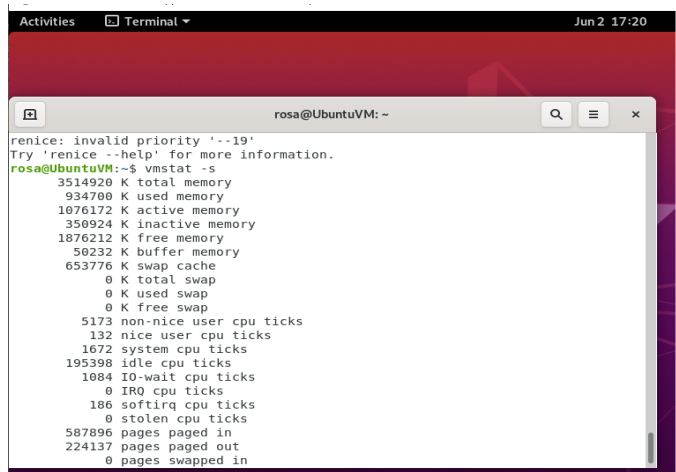
4. Change the priority of a process with default arguments. `-sudo renice -new prio -pid`

A terminal window titled 'rosa@UbuntuVM: ~' is shown. The terminal displays the output of the 'top -p 2593' command, which shows the process 2593. The output is '[2]+ Stopped top -p 2593'. Below this, the command 'sudo renice -19 2593' is entered, and the output '2593 (process ID) old priority 0, new priority -19' is displayed. The command 'sudo renice -0 2593' is then entered, and the output '2593 (process ID) old priority -19, new priority 0' is displayed.

```
[2]+ Stopped top -p 2593
rosa@UbuntuVM:~$ sudo renice -19 2593
2593 (process ID) old priority 0, new priority -19
rosa@UbuntuVM:~$ sudo renice -0 2593
2593 (process ID) old priority -19, new priority 0
```

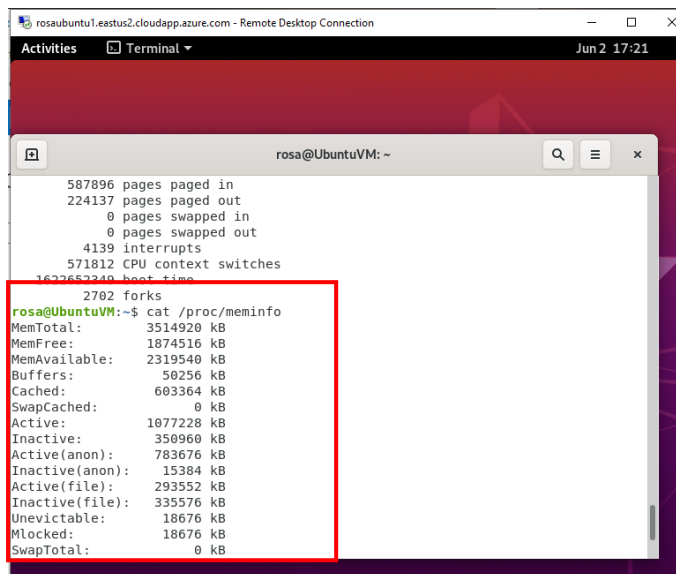
## 5. Display Virtual Memory Statistics.

vmstat -s



```
renice: invalid priority '--19'
Try 'renice --help' for more information.
rosa@UbuntuVM:~$ vmstat -s
3514920 K total memory
934700 K used memory
1076172 K active memory
350924 K inactive memory
1876212 K free memory
50232 K buffer memory
653776 K swap cache
0 K total swap
0 K used swap
0 K free swap
5173 non-nice user cpu ticks
132 nice user cpu ticks
1672 system cpu ticks
195398 idle cpu ticks
1084 IO-wait cpu ticks
0 IRQ cpu ticks
186 softirq cpu ticks
0 stolen cpu ticks
587896 pages paged in
224137 pages paged out
0 pages swapped in
0 pages swapped out
```

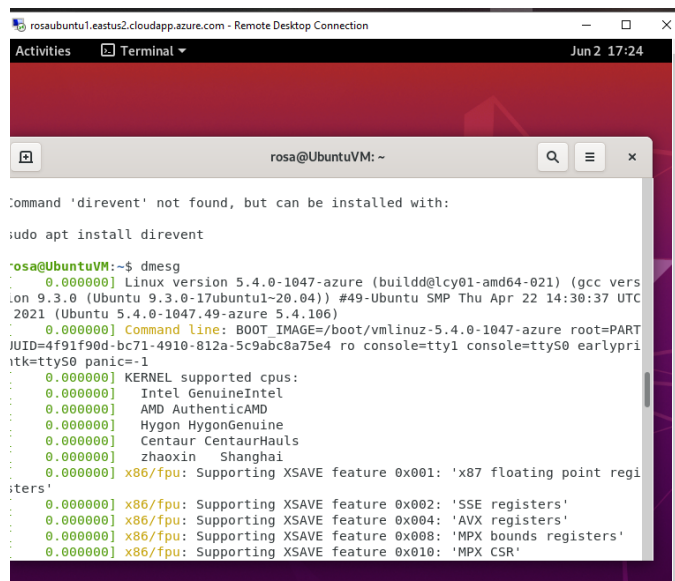
Or: cat /proc/meminfo



```
587896 pages paged in
224137 pages paged out
0 pages swapped in
0 pages swapped out
4139 interrupts
571812 CPU context switches
162265240 boot time
2702 forks
rosa@UbuntuVM:~$ cat /proc/meminfo
MemTotal: 3514920 kB
MemFree: 1874516 kB
MemAvailable: 2319540 kB
Buffers: 50256 kB
Cached: 603364 kB
SwapCached: 0 kB
Active: 1077228 kB
Inactive: 350960 kB
Active(anon): 783676 kB
Inactive(anon): 15384 kB
Active(file): 293552 kB
Inactive(file): 335576 kB
Unevictable: 18676 kB
Mlocked: 18676 kB
SwapTotal: 0 kB
```

## 6. Display System Event Information. `dmesg`

command

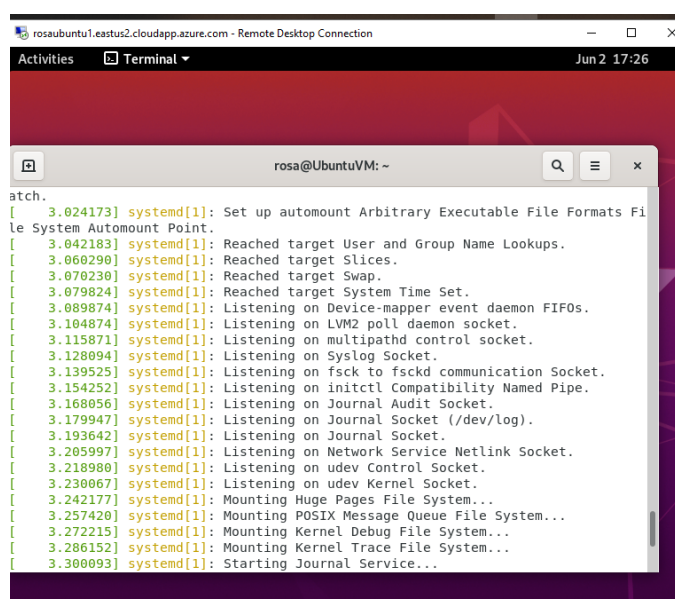


A terminal window titled 'rosabuntu1.eastus2.cloudapp.azure.com - Remote Desktop Connection' with a date and time of 'Jun 2 17:24'. The terminal shows the following commands and output:

```
command 'direvent' not found, but can be installed with:
sudo apt install direvent

rosabuntu1:~$ dmesg
[0.000000] Linux version 5.4.0-1047-azure (build@lcy01-amd64-021) (gcc vers
on 9.3.0 (Ubuntu 9.3.0-17ubuntu1~20.04)) #49-Ubuntu SMP Thu Apr 22 14:30:37 UTC
2021 (Ubuntu 5.4.0-1047.49-azure 5.4.106)
[0.000000] Command line: BOOT_IMAGE=/boot/vmlinuz-5.4.0-1047-azure root=PART
UUID=4f91f90d-bc71-4910-812a-5c9abc8a75e4 ro console=tty1 console=ttyS0 earlypri
ntk=ttyS0 panic=-1
[0.000000] KERNEL supported cpus:
[0.000000] Intel GenuineIntel
[0.000000] AMD AuthenticAMD
[0.000000] Hygon HygonGenuine
[0.000000] Centaur CentaurHauls
[0.000000] zhaoxin Shanghai
[0.000000] x86/fpu: Supporting XSAVE feature 0x001: 'x87 floating point regis
ters'
[0.000000] x86/fpu: Supporting XSAVE feature 0x002: 'SSE registers'
[0.000000] x86/fpu: Supporting XSAVE feature 0x004: 'AVX registers'
[0.000000] x86/fpu: Supporting XSAVE feature 0x008: 'MPX bounds registers'
[0.000000] x86/fpu: Supporting XSAVE feature 0x010: 'MPX CSR'
```

Output continued,

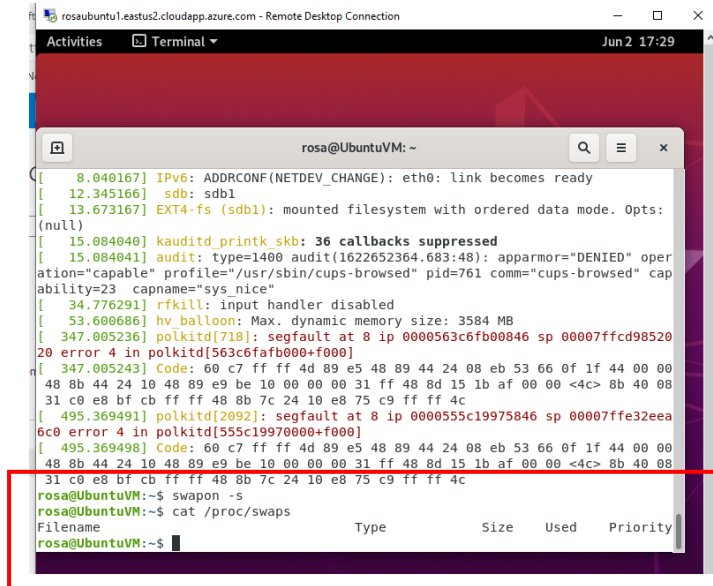


A terminal window titled 'rosabuntu1.eastus2.cloudapp.azure.com - Remote Desktop Connection' with a date and time of 'Jun 2 17:26'. The terminal shows the following output from the systemd service:

```
atch.
[ 3.024173] systemd[1]: Set up automount Arbitrary Executable File Formats Fi
le System Automount Point.
[ 3.042183] systemd[1]: Reached target User and Group Name Lookups.
[ 3.060290] systemd[1]: Reached target Slices.
[ 3.070230] systemd[1]: Reached target Swap.
[ 3.079824] systemd[1]: Reached target System Time Set.
[ 3.089874] systemd[1]: Listening on Device-mapper event daemon FIFOs.
[ 3.104874] systemd[1]: Listening on LVM2 poll daemon socket.
[ 3.115871] systemd[1]: Listening on multipathd control socket.
[ 3.128094] systemd[1]: Listening on Syslog Socket.
[ 3.139525] systemd[1]: Listening on fsck to fsckd communication Socket.
[ 3.154252] systemd[1]: Listening on initctl Compatibility Named Pipe.
[ 3.168056] systemd[1]: Listening on Journal Audit Socket.
[ 3.179947] systemd[1]: Listening on Journal Socket (/dev/log).
[ 3.193642] systemd[1]: Listening on Journal Socket.
[ 3.205997] systemd[1]: Listening on Network Service Netlink Socket.
[ 3.218980] systemd[1]: Listening on udev Control Socket.
[ 3.230067] systemd[1]: Listening on udev Kernel Socket.
[ 3.242177] systemd[1]: Mounting Huge Pages File System...
[ 3.257420] systemd[1]: Mounting POSIX Message Queue File System...
[ 3.272215] systemd[1]: Mounting Kernel Debug File System...
[ 3.286152] systemd[1]: Mounting Kernel Trace File System...
[ 3.300093] systemd[1]: Starting Journal Service...
```

## 7. Display Swapping Statistics.

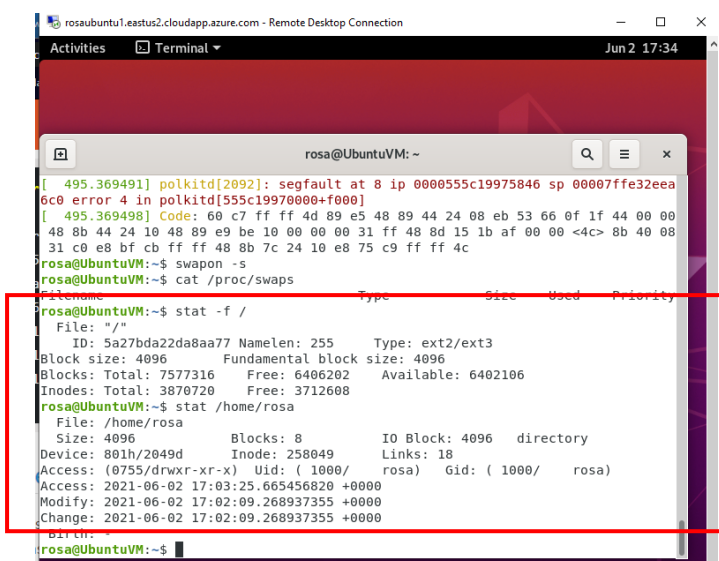
The swapping stats for my machine was empty, but the command is there. :swapon -s



A terminal window showing system logs and the output of the 'swapon -s' command. The logs include messages from IP6v6, sdb, EXT4-fs, kauditd, audit, rtkill, hv balloon, and polkitd. The 'swapon -s' command output is empty, showing only the column headers: Filename, Type, Size, Used, and Priority.

```
[ 8.040167] IP6v6: ADDRCONF(NETDEV_CHANGE): eth0: link becomes ready
[ 12.345166] sdb: sdb1
[ 13.673167] EXT4-fs (sdb1): mounted filesystem with ordered data mode. Opts:
(null)
[ 15.084040] kauditd_printk_skb: 36 callbacks suppressed
[ 15.084041] audit: type=1400 audit(1622652364.683:48): apparmor="DENIED" operation="capable" profile="/usr/sbin/cups-browsed" pid=761 comm="cups-browsed" capability=23 capname="sys_nice"
[ 34.776291] rtkill: input handler disabled
[ 53.600686] hv_balloon: Max. dynamic memory size: 3584 MB
[ 347.005236] polkitd[718]: segfault at 8 ip 0000563c6fb00846 sp 00007ffcd98520
error 4 in polkitd[563c6fb000+f000]
[ 347.005243] Code: 60 c7 ff ff 4d 89 e5 48 89 44 24 08 eb 53 66 0f 1f 44 00 00
48 8b 44 24 10 48 89 e9 be 10 00 00 00 31 ff 48 8d 15 1b af 00 00 <4c> 8b 40 08
31 c0 e8 bf cb ff ff 48 8b 7c 24 10 e8 75 c9 ff ff 4c
[ 495.369491] polkitd[2092]: segfault at 8 ip 0000555c19975846 sp 00007ffe32eea
6c0 error 4 in polkitd[555c19970000+f000]
[ 495.369498] Code: 60 c7 ff ff 4d 89 e5 48 89 44 24 08 eb 53 66 0f 1f 44 00 00
48 8b 44 24 10 48 89 e9 be 10 00 00 00 31 ff 48 8d 15 1b af 00 00 <4c> 8b 40 08
31 c0 e8 bf cb ff ff 48 8b 7c 24 10 e8 75 c9 ff ff 4c
rosa@UbuntuVM:~$ swapon -s
rosa@UbuntuVM:~$ cat /proc/swaps
      Type      Size  Used  Priority
rosa@UbuntuVM:~$
```

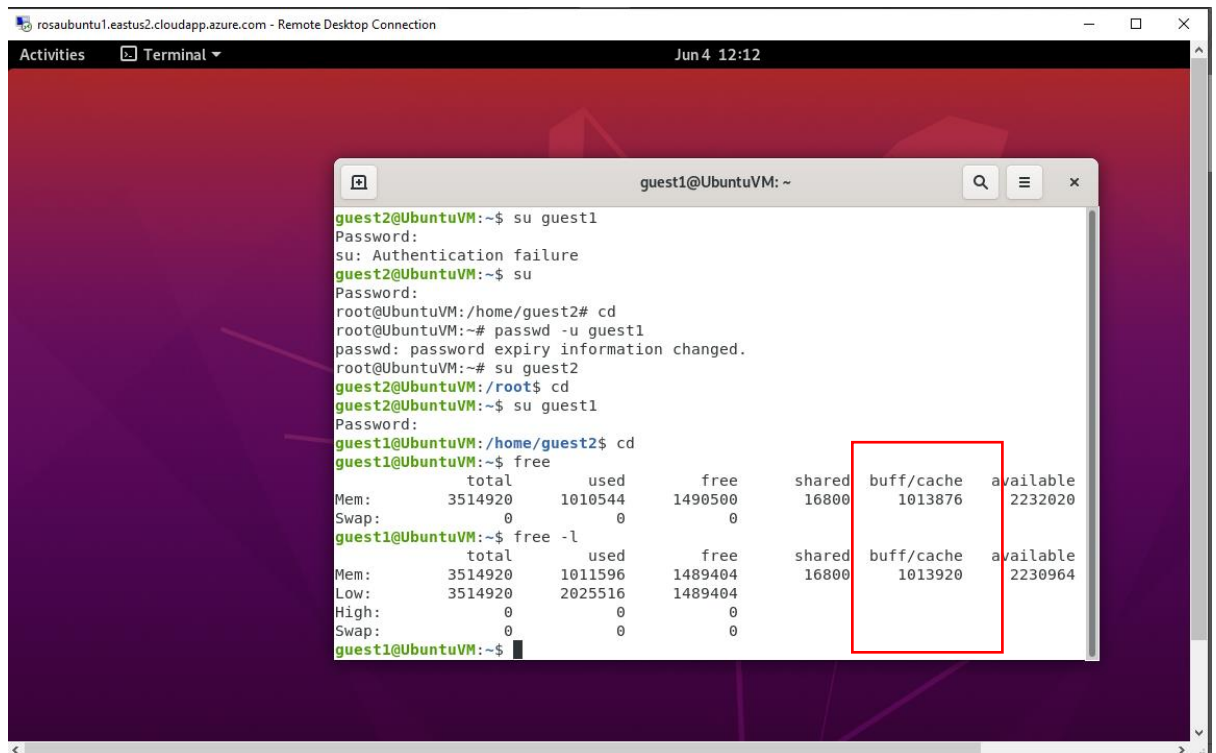
## 8. Check File Access statistics. :stat -f



A terminal window showing the output of the 'stat -f /' command. The output displays file statistics for the root directory, including file ID, name, type, block size, fundamental block size, total blocks, free blocks, available blocks, total inodes, free inodes, file size, blocks, IO block, directory, device, inode, links, access, modify, and change times.

```
[ 495.369491] polkitd[2092]: segfault at 8 ip 0000555c19975846 sp 00007ffe32eea
6c0 error 4 in polkitd[555c19970000+f000]
[ 495.369498] Code: 60 c7 ff ff 4d 89 e5 48 89 44 24 08 eb 53 66 0f 1f 44 00 00
48 8b 44 24 10 48 89 e9 be 10 00 00 00 31 ff 48 8d 15 1b af 00 00 <4c> 8b 40 08
31 c0 e8 bf cb ff ff 48 8b 7c 24 10 e8 75 c9 ff ff 4c
rosa@UbuntuVM:~$ swapon -s
rosa@UbuntuVM:~$ cat /proc/swaps
      Type      Size  Used  Priority
rosa@UbuntuVM:~$ stat -f /
File: "/"
ID: 5a27bda22da8aa77 Namelen: 255      Type: ext2/ext3
Block size: 4096      Fundamental block size: 4096
Blocks: Total: 7577316 Free: 6406202 Available: 6402106
Inodes: Total: 3870720 Free: 3712608
rosa@UbuntuVM:~$ stat /home/rosa
File: /home/rosa
Size: 4096      Blocks: 8      IO Block: 4096 directory
Device: 801h/2049d Inode: 258049 Links: 18
Access: (0755/drwxr-xr-x) Uid: ( 1000/  rosa) Gid: ( 1000/  rosa)
Access: 2021-06-02 17:03:25.665456820 +0000
Modify: 2021-06-02 17:02:09.268937355 +0000
Change: 2021-06-02 17:02:09.268937355 +0000
rosa@UbuntuVM:~$
```

## 9. Check Buffer analysis statistics. :free or free -l



The screenshot shows a terminal window titled "guest1@UbuntuVM: ~" with a red background. The user has executed several commands to switch between users and check memory statistics. The output of the 'free' command is shown, with a red box highlighting the 'buff/cache' and 'available' columns.

```
guest2@UbuntuVM:~$ su guest1
Password:
su: Authentication failure
guest2@UbuntuVM:~$ su
Password:
root@UbuntuVM:/home/guest2# cd
root@UbuntuVM:~# passwd -u guest1
passwd: password expiry information changed.
root@UbuntuVM:~# su guest2
guest2@UbuntuVM:/root$ cd
guest2@UbuntuVM:/root$ su guest1
Password:
guest1@UbuntuVM:/home/guest2$ cd
guest1@UbuntuVM:~$ free
```

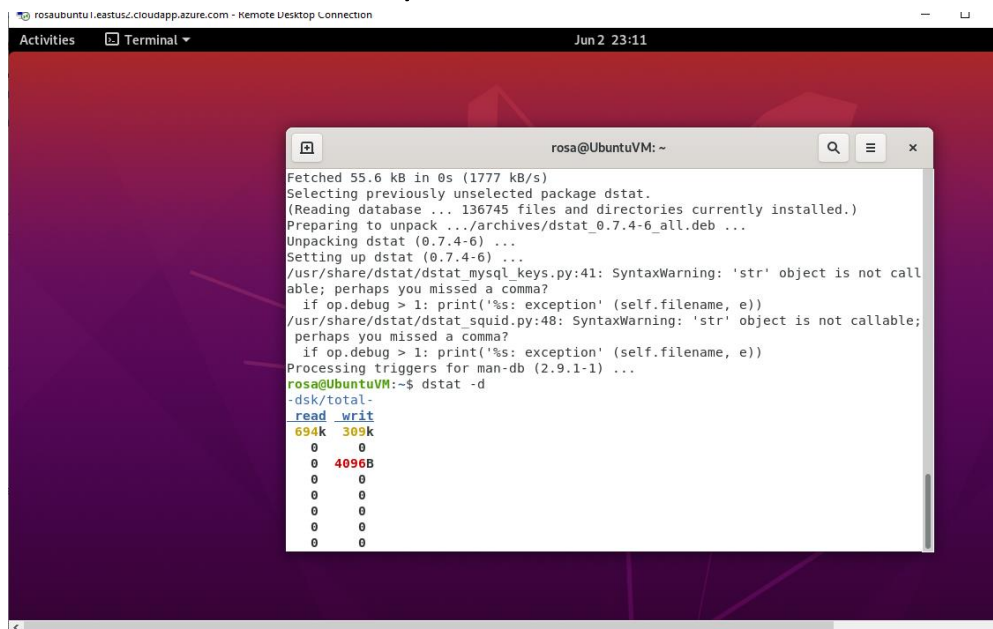
	total	used	free	shared	buff/cache	available
Mem:	3514920	1010544	1490500	16800	1013876	2232020
Swap:	0	0	0			

```
guest1@UbuntuVM:~$ free -l
```

	total	used	free	shared	buff/cache	available
Mem:	3514920	1011596	1489404	16800	1013920	2230964
Low:	3514920	2025516	1489404			
High:	0	0	0			
Swap:	0	0	0			

```
guest1@UbuntuVM:~$
```

## 10. Check Disk Activity statistics. :dstat -d



The screenshot shows a terminal window titled "rosa@UbuntuVM: ~" with a red background. The user has installed 'dstat' and run the command 'dstat -d'. The output shows disk activity statistics in a table format.

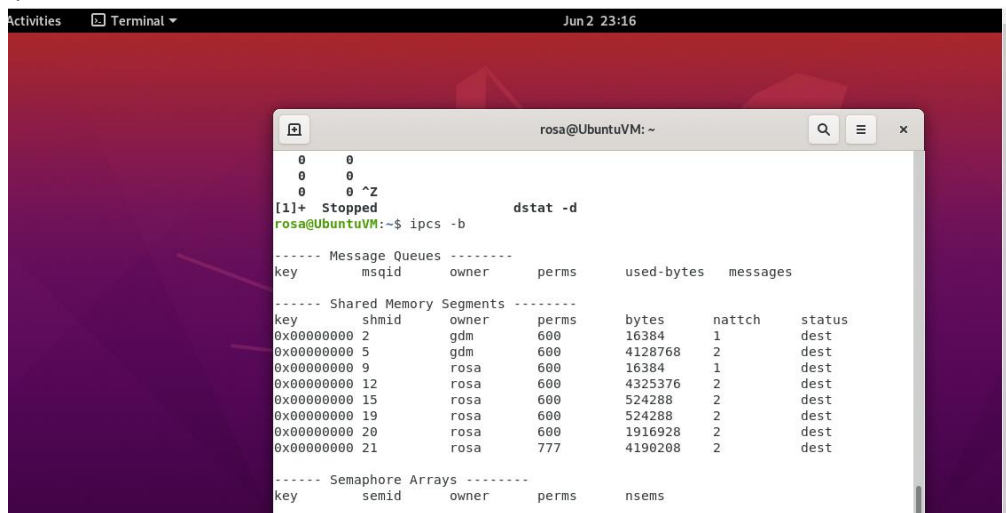
```
Fetchd 55.6 kB in 0s (1777 kB/s)
Selecting previously unselected package dstat.
(Reading database ... 136745 files and directories currently installed.)
Preparing to unpack .../archives/dstat_0.7.4-6_all.deb ...
Unpacking dstat (0.7.4-6) ...
Setting up dstat (0.7.4-6) ...
/usr/share/dstat/dstat_mysql_keys.py:41: SyntaxWarning: 'str' object is not call
able; perhaps you missed a comma?
  if op.debug > 1: print('%s: exception' % (self.filename, e))
/usr/share/dstat/dstat_squid.py:48: SyntaxWarning: 'str' object is not callabl
e; perhaps you missed a comma?
  if op.debug > 1: print('%s: exception' % (self.filename, e))
Processing triggers for man-db (2.9.1-1) ...
rosa@UbuntuVM:~$ dstat -d
```

-dsk/total-	read	writ
	694k	309k
	0	0
	0	4096B
	0	0
	0	0
	0	0
	0	0
	0	0



## 11. Check Inter process Communication statistics.

ipcs -b

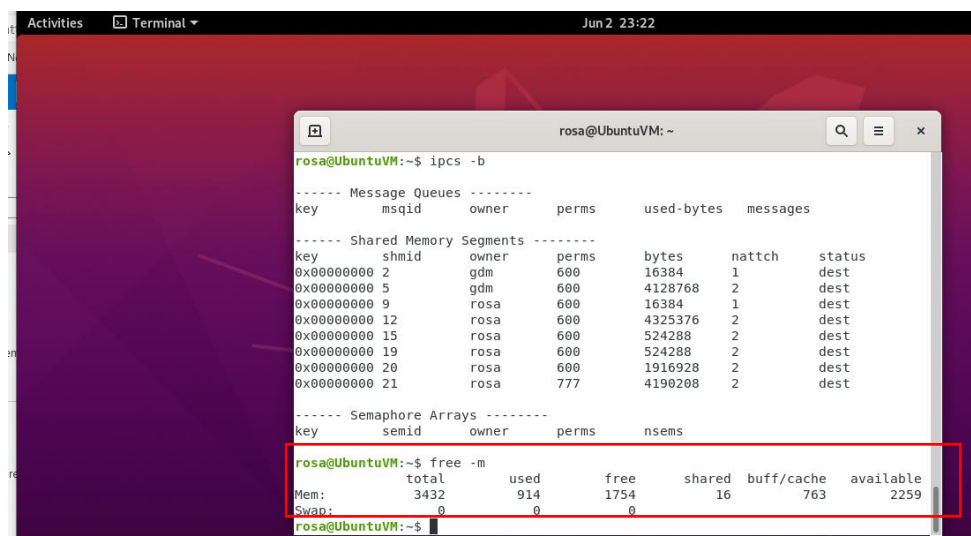


A terminal window titled 'rosal@UbuntuVM: ~' showing the output of the 'ipcs -b' command. The output is divided into three sections: Message Queues, Shared Memory Segments, and Semaphore Arrays. The Message Queues section shows a single entry for 'msqid' with key '0' and owner '0'. The Shared Memory Segments section shows a table with columns 'key', 'shmid', 'owner', 'perms', 'bytes', 'nattch', and 'status'. The Semaphore Arrays section shows a table with columns 'key', 'semid', 'owner', 'perms', and 'nsems'.

```
0 0
0 0
0 0 ^Z
[1]+  Stopped                  dstat -d
rosal@UbuntuVM:~$ ipcs -b

----- Message Queues -----
key      msqid    owner    perms    used-bytes   messages
----- Shared Memory Segments -----
key      shmid    owner    perms    bytes       nattch     status
0x00000000 2        gdm      600      16384        1          dest
0x00000000 5        gdm      600      4128768      2          dest
0x00000000 9        rosa     600      16384        1          dest
0x00000000 12       rosa     600      4325376      2          dest
0x00000000 15       rosa     600      524288       2          dest
0x00000000 19       rosa     600      524288       2          dest
0x00000000 20       rosa     600      1916928      2          dest
0x00000000 21       rosa     777      4190208      2          dest
----- Semaphore Arrays -----
key      semid     owner    perms    nsems
```

## 12. Check Unused Memory in the server. Free -m

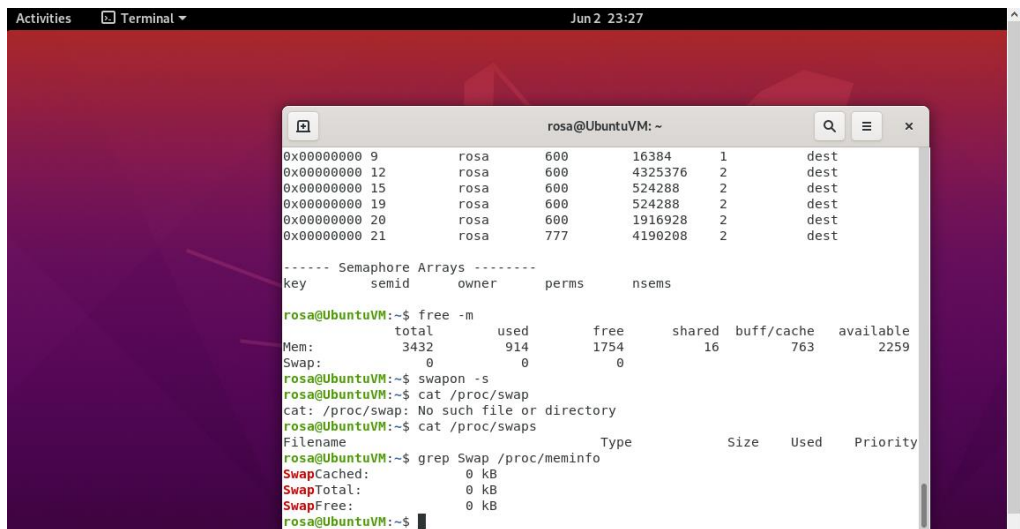


A terminal window titled 'rosal@UbuntuVM: ~' showing the output of the 'free -m' command. The output is a table with columns 'total', 'used', 'free', 'shared', 'buff/cache', and 'available'. The 'Mem:' row shows values 3432, 914, 1754, 16, 763, and 2259. The 'Swap:' row shows values 0, 0, 0, and empty cells for the remaining columns. A red box highlights the 'Mem:' and 'Swap:' rows.

```
rosal@UbuntuVM:~$ ipcs -b
----- Message Queues -----
key      msqid    owner    perms    used-bytes   messages
----- Shared Memory Segments -----
key      shmid    owner    perms    bytes       nattch     status
0x00000000 2        gdm      600      16384        1          dest
0x00000000 5        gdm      600      4128768      2          dest
0x00000000 9        rosa     600      16384        1          dest
0x00000000 12       rosa     600      4325376      2          dest
0x00000000 15       rosa     600      524288       2          dest
0x00000000 19       rosa     600      524288       2          dest
0x00000000 20       rosa     600      1916928      2          dest
0x00000000 21       rosa     777      4190208      2          dest
----- Semaphore Arrays -----
key      semid     owner    perms    nsems

rosal@UbuntuVM:~$ free -m
total        used        free        shared    buff/cache   available
Mem:    3432         914        1754         16         763        2259
Swap:      0           0           0
```

### 13. Check Swap Activities. Grep Swap /proc/meminfo



A terminal window titled 'rosa@UbuntuVM: ~' showing the following output:

```
0x00000000 9      rosa      600      16384      1      dest
0x00000000 12     rosa      600      4325376    2      dest
0x00000000 15     rosa      600      524288     2      dest
0x00000000 19     rosa      600      524288     2      dest
0x00000000 20     rosa      600      1916928    2      dest
0x00000000 21     rosa      777      4190208    2      dest

----- Semaphore Arrays -----
key          semid      owner      perms      nsems

rosa@UbuntuVM:~$ free -m
Mem:          total        used         free      shared  buff/cache   available
Swap:           0           0           0           16       763       2259

rosa@UbuntuVM:~$ swapon -s
rosa@UbuntuVM:~$ cat /proc/swap
cat: /proc/swap: No such file or directory
rosa@UbuntuVM:~$ cat /proc/swaps
Filename                                Type                                Size  Used  Priority
rosa@UbuntuVM:~$ grep Swap /proc/meminfo
SwapCached:            0 kB
SwapTotal:              0 kB
SwapFree:              0 kB
rosa@UbuntuVM:~$
```

## PART B – USER ACTIVITIES

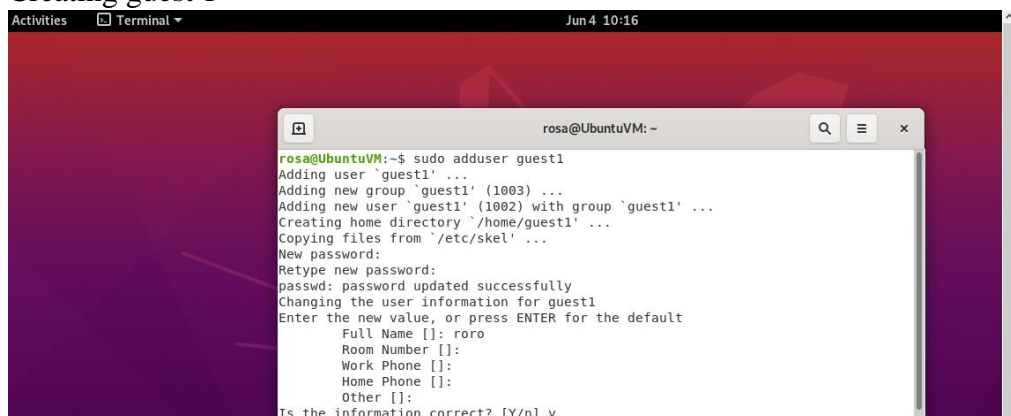
Login to your terminal in Ubuntu. After logging in, the following were performed.

---

*Create a user account called user1 and another user2*

---

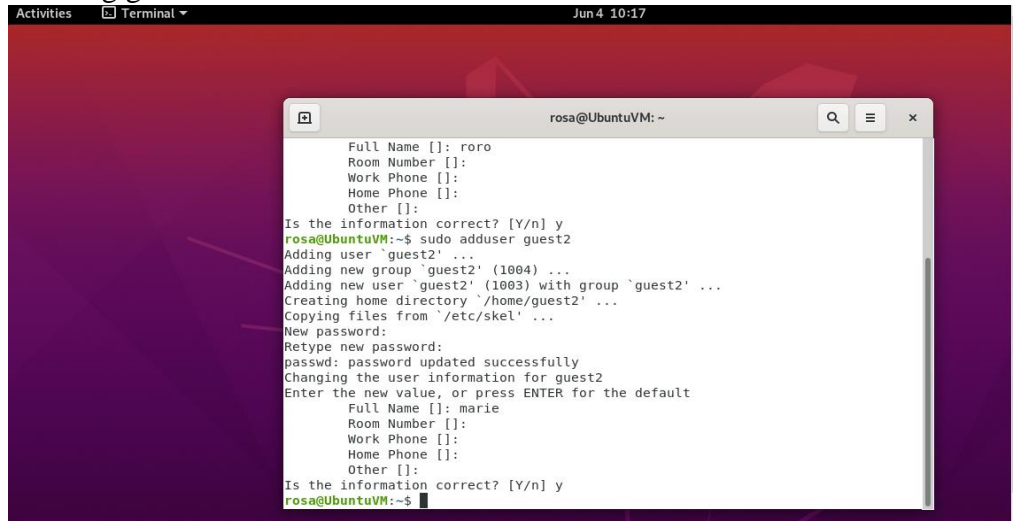
### Creating guest 1



A terminal window titled 'rosa@UbuntuVM: ~' showing the following output:

```
rosa@UbuntuVM:~$ sudo adduser guest1
Adding user 'guest1' ...
Adding new group 'guest1' (1003) ...
Adding new user 'guest1' (1002) with group 'guest1' ...
Creating home directory '/home/guest1' ...
Copying files from '/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for guest1
Enter the new value, or press ENTER for the default
  Full Name []: roro
    Room Number []:
    Work Phone []:
    Home Phone []:
      Other []:
Is the information correct? [Y/n] y
```

## Creating guest2

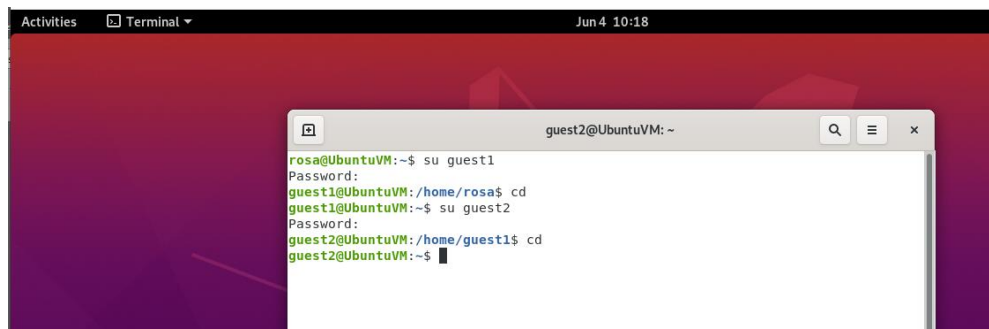


```
Activities Terminal Jun 4 10:17
rosa@UbuntuVM: ~
Full Name []: roro
Room Number []:
Work Phone []:
Home Phone []:
Other []:
Is the information correct? [Y/n] y
rosa@UbuntuVM:~$ sudo adduser guest2
Adding user `guest2' ...
Adding new group `guest2' (1004) ...
Adding new user `guest2' (1003) with group `guest2' ...
Creating home directory `/home/guest2' ...
Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for guest2
Enter the new value, or press ENTER for the default
Full Name []: marie
Room Number []:
Work Phone []:
Home Phone []:
Other []:
Is the information correct? [Y/n] y
rosa@UbuntuVM:~$
```

---

*Ensure user1 and user2 are password protected.*

---




```
Activities Terminal Jun 4 10:18
guest2@UbuntuVM: ~
rosa@UbuntuVM:~$ su guest1
Password:
guest1@UbuntuVM:/home/rosa$ cd
guest1@UbuntuVM:~$ su guest2
Password:
guest2@UbuntuVM:/home/guest1$ cd
guest2@UbuntuVM:~$
```

---

*Logout and login as user1*

---

To login to guest1, use the su guest1 command and type the password



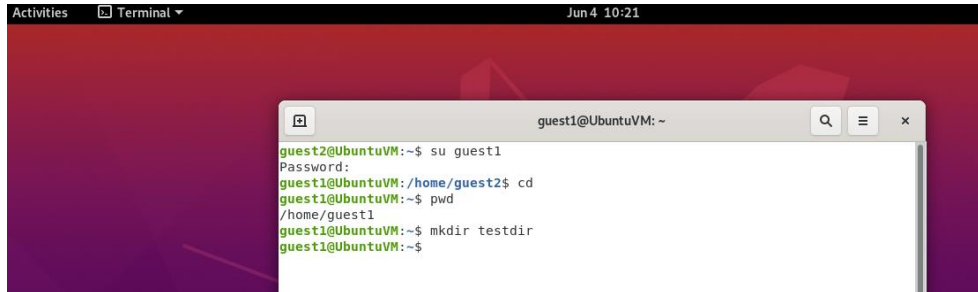
```
Activities Terminal Jun 4 10:19
guest1@UbuntuVM: ~
guest2@UbuntuVM:~$ su guest1
Password:
guest1@UbuntuVM:/home/guest2$ cd
guest1@UbuntuVM:~$
```

---

### Create a testdir

---

While in guest1, create a testdir folder with the mkdir command



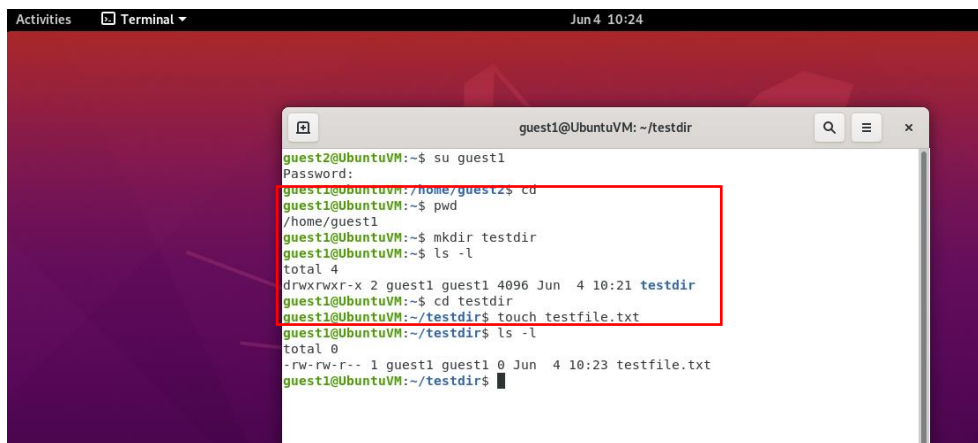
```
Activities Terminal Jun 4 10:21
guest2@UbuntuVM:~$ su guest1
Password:
guest1@UbuntuVM:/home/guest2$ cd
guest1@UbuntuVM:~$ pwd
/home/guest1
guest1@UbuntuVM:~$ mkdir testdir
guest1@UbuntuVM:~$
```

---

### Create a file testfile in testdir

---

Use cd to enter the testdir folder, and use the touch command to create the testfile



```
Activities Terminal Jun 4 10:24
guest1@UbuntuVM:~/testdir$
guest2@UbuntuVM:~$ su guest1
Password:
guest1@UbuntuVM:/home/guest2$ cd
guest1@UbuntuVM:~$ pwd
/home/guest1
guest1@UbuntuVM:~$ mkdir testdir
guest1@UbuntuVM:~$ ls -l
total 4
drwxrwxr-x 2 guest1 guest1 4096 Jun  4 10:21 testdir
guest1@UbuntuVM:~$ cd testdir
guest1@UbuntuVM:~/testdir$ touch testfile.txt
guest1@UbuntuVM:~/testdir$ ls -l
total 0
-rw-rw-r-- 1 guest1 guest1 0 Jun  4 10:23 testfile.txt
guest1@UbuntuVM:~/testdir$
```

---

### Verify the ownership and the group of the testfile

---

To verify, use the ls -l command to display information about the file. The ownership and group are all guest1.



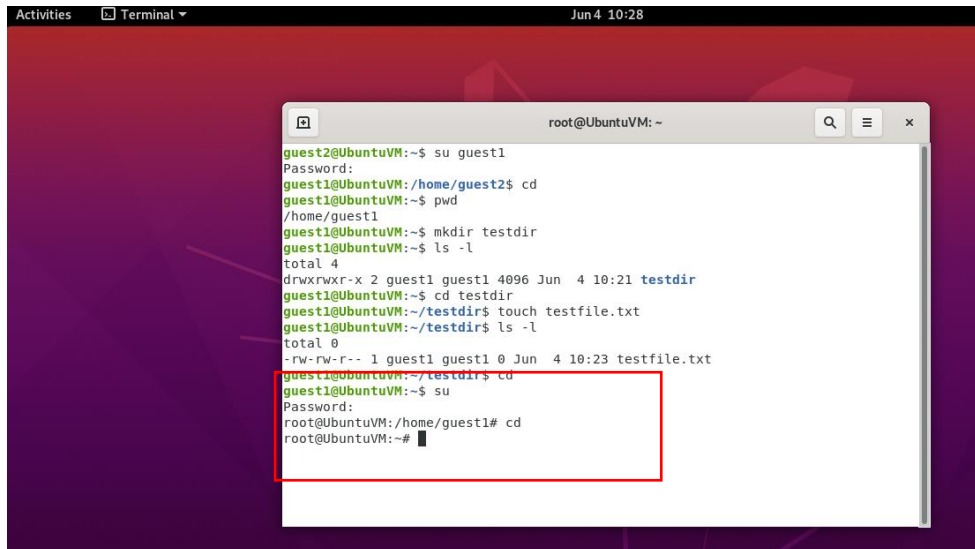
```
/home/guest1
guest1@UbuntuVM:~$ mkdir testdir
guest1@UbuntuVM:~$ ls -l
total 4
drwxrwxr-x 2 guest1 guest1 4096 Jun  4 10:21 testdir
guest1@UbuntuVM:~$ cd testdir
guest1@UbuntuVM:~/testdir$ touch testfile.txt
guest1@UbuntuVM:~/testdir$ ls -l
total 0
-rw-rw-r-- 1 guest1 guest1 0 Jun  4 10:23 testfile.txt
guest1@UbuntuVM:~/testdir$
```

---

### Switch to Superuser account

---

Switching to superuser or root user with su command. Then after, enter the password.



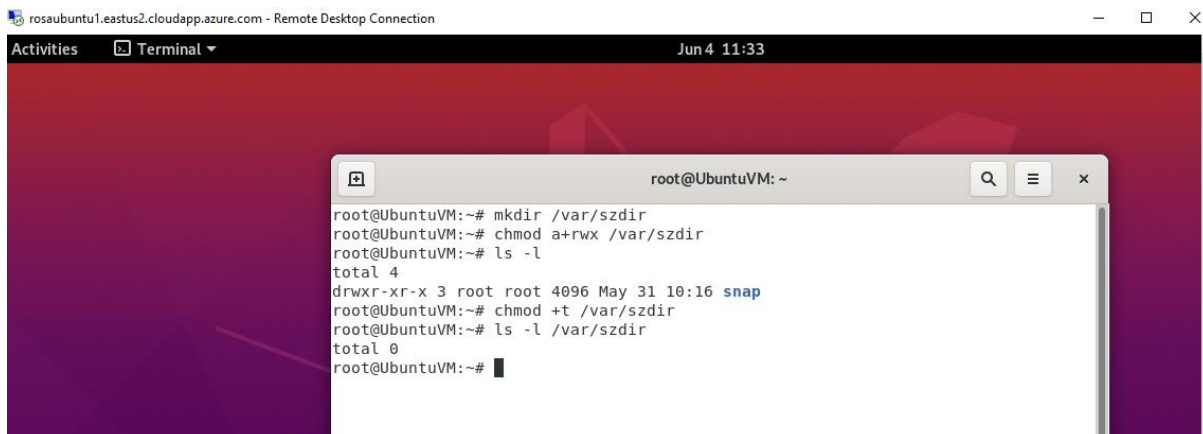
```
Activities Terminal Jun 4 10:28
root@UbuntuVM: ~
guest2@UbuntuVM:~$ su guest1
Password:
guest1@UbuntuVM:/home/guest2$ cd
guest1@UbuntuVM:~$ pwd
/home/guest1
guest1@UbuntuVM:~$ mkdir testdir
guest1@UbuntuVM:~$ ls -l
total 4
drwxrwxr-x 2 guest1 guest1 4096 Jun  4 10:21 testdir
guest1@UbuntuVM:~$ cd testdir
guest1@UbuntuVM:~/testdir$ touch testfile.txt
guest1@UbuntuVM:~/testdir$ ls -l
total 0
-rw-rw-r-- 1 guest1 guest1 0 Jun  4 10:23 testfile.txt
guest1@UbuntuVM:~/testdir$ cd
guest1@UbuntuVM:~$ su
Password:
root@UbuntuVM:/home/guest1# cd
root@UbuntuVM:~#
```

---

### Create a public directory dir

---

Created a public directory from root. Gave all users the permission to read, write and execute (using chmod a+rwX).



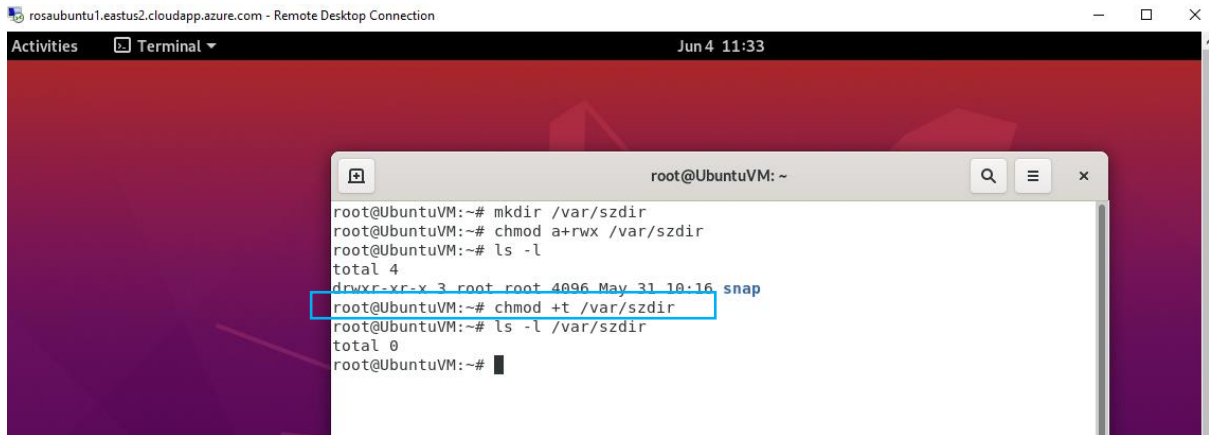
```
rosaubuntu1.eastus2.cloudapp.azure.com - Remote Desktop Connection
Activities Terminal Jun 4 11:33
root@UbuntuVM:~# mkdir /var/szdir
root@UbuntuVM:~# chmod a+rwX /var/szdir
root@UbuntuVM:~# ls -l
total 4
drwxr-xr-x 3 root root 4096 May 31 10:16 snap
root@UbuntuVM:~# chmod +t /var/szdir
root@UbuntuVM:~# ls -l /var/szdir
total 0
root@UbuntuVM:~#
```

---

### *Set stickybit (save text attribute) on dir1*

---

Also set sticky bit on dir with the `chmod +t directorypath` command.



A terminal window titled 'root@UbuntuVM: ~' showing the following commands and output:

```
root@UbuntuVM:~# mkdir /var/szdir
root@UbuntuVM:~# chmod a+rwX /var/szdir
root@UbuntuVM:~# ls -l
total 4
drwxr-xr-x 3 root root 4096 May 31 10:16 snap
root@UbuntuVM:~# chmod +t /var/szdir
root@UbuntuVM:~# ls -l /var/szdir
total 0
root@UbuntuVM:~#
```

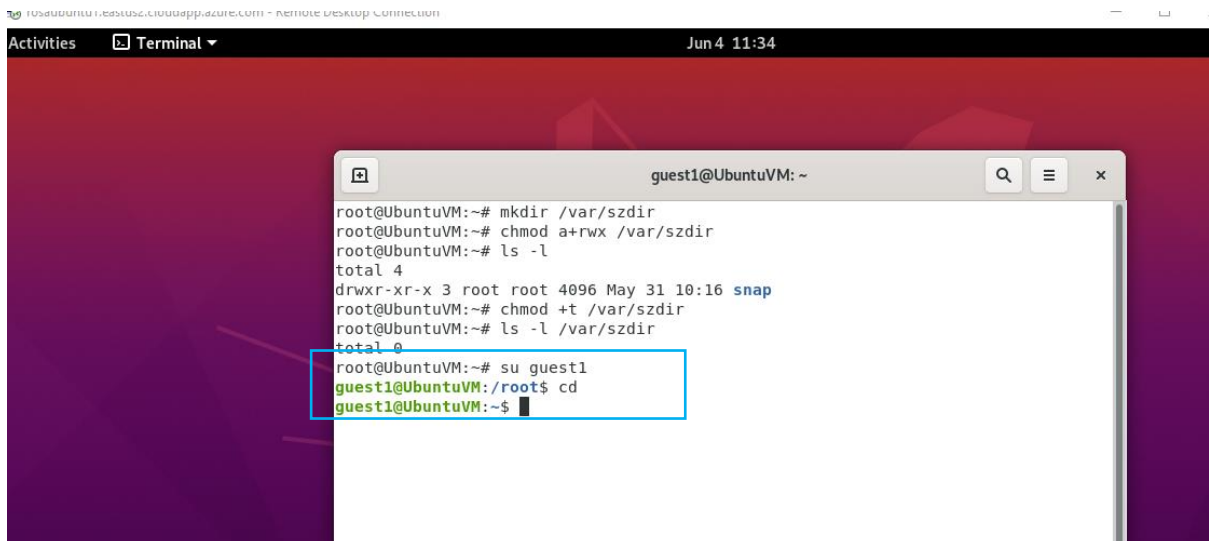
The `chmod +t /var/szdir` command is highlighted with a blue box.

---

### *Logout and login as a normal user user1*

---

Login to guest1 using the `su guest1` command.



A terminal window titled 'guest1@UbuntuVM: ~' showing the following commands and output:

```
root@UbuntuVM:~# mkdir /var/szdir
root@UbuntuVM:~# chmod a+rwX /var/szdir
root@UbuntuVM:~# ls -l
total 4
drwxr-xr-x 3 root root 4096 May 31 10:16 snap
root@UbuntuVM:~# chmod +t /var/szdir
root@UbuntuVM:~# ls -l /var/szdir
total 0
root@UbuntuVM:~# su guest1
guest1@UbuntuVM:/root$ cd
guest1@UbuntuVM:~$
```

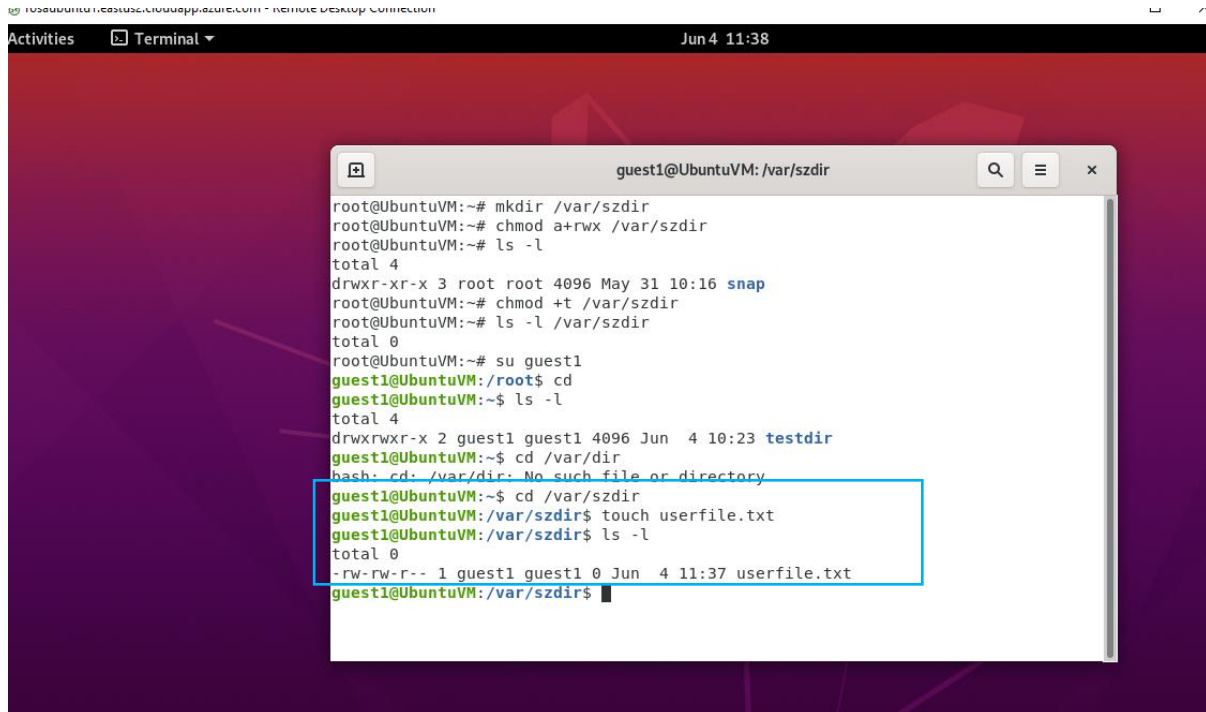
The `su guest1` command is highlighted with a blue box.

---

### Create a file userfile1 in dir1

---

Navigate/ cd to the public folder and create the userfile in there with the touch command.



The screenshot shows a terminal window titled 'guest1@UbuntuVM: /var/szdir'. The user is root. The commands and output are as follows:

```
root@UbuntuVM:~# mkdir /var/szdir
root@UbuntuVM:~# chmod a+rwX /var/szdir
root@UbuntuVM:~# ls -l
total 4
drwxr-xr-x 3 root root 4096 May 31 10:16 snap
root@UbuntuVM:~# chmod +t /var/szdir
root@UbuntuVM:~# ls -l /var/szdir
total 0
root@UbuntuVM:~# su guest1
guest1@UbuntuVM:/root$ cd
guest1@UbuntuVM:~$ ls -l
total 4
drwxrwxr-x 2 guest1 guest1 4096 Jun  4 10:23 testdir
guest1@UbuntuVM:~$ cd /var/dir
bash: cd: /var/dir: No such file or directory
guest1@UbuntuVM:~$ cd /var/szdir
guest1@UbuntuVM:/var/szdir$ touch userfile.txt
guest1@UbuntuVM:/var/szdir$ ls -l
total 0
-rw-rw-r-- 1 guest1 guest1 0 Jun  4 11:37 userfile.txt
guest1@UbuntuVM:/var/szdir$
```

---

### Login as a different user user2

---

Use the su guest2 to login to a different user called guest2



The screenshot shows a terminal window with the following commands and output:

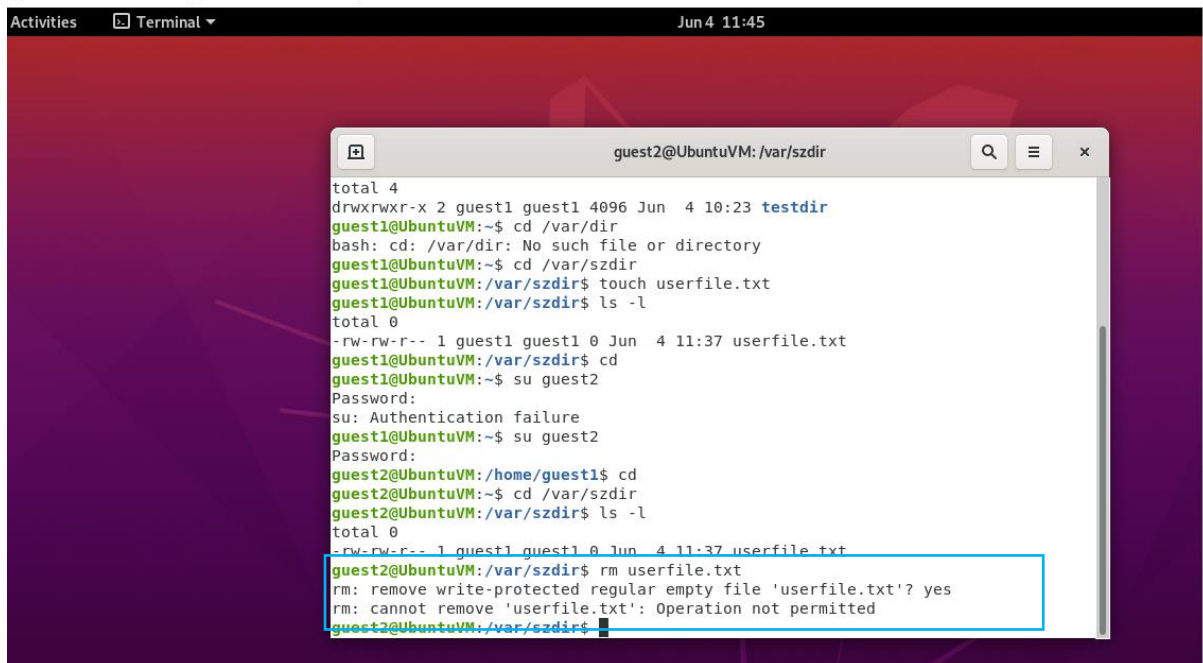
```
guest1@UbuntuVM:~$ su guest2
Password:
guest2@UbuntuVM:/home/guest1$ cd
```

---

*Try to edit or remove the file*

---

Trying to remove the userfile created by guest1 in guest2 using the rm command. Permission was denied due to sticky bit placed on folder.



```
total 4
drwxrwxr-x 2 guest1 guest1 4096 Jun  4 10:23 testdir
guest1@UbuntuVM:~$ cd /var/dir
bash: cd: /var/dir: No such file or directory
guest1@UbuntuVM:~$ cd /var/szdir
guest1@UbuntuVM:/var/szdir$ touch userfile.txt
guest1@UbuntuVM:/var/szdir$ ls -l
total 0
-rw-rw-r-- 1 guest1 guest1 0 Jun  4 11:37 userfile.txt
guest1@UbuntuVM:/var/szdir$ cd
guest1@UbuntuVM:~$ su guest2
Password:
su: Authentication failure
guest1@UbuntuVM:~$ su guest2
Password:
guest2@UbuntuVM:/home/guest1$ cd
guest2@UbuntuVM:~$ cd /var/szdir
guest2@UbuntuVM:/var/szdir$ ls -l
total 0
-rw-rw-r-- 1 guest1 guest1 0 Jun  4 11:37 userfile.txt
guest2@UbuntuVM:/var/szdir$ rm userfile.txt
rm: remove write-protected regular empty file 'userfile.txt'? yes
rm: cannot remove 'userfile.txt': Operation not permitted
guest2@UbuntuVM:/var/szdir$
```

---

*Temporarily disable user logins*

---

To temporarily disable the login of user: guest1, I locked the password from the root.



```
root@UbuntuVM:~# passwd -l guest1
passwd: password expiry information changed.
```

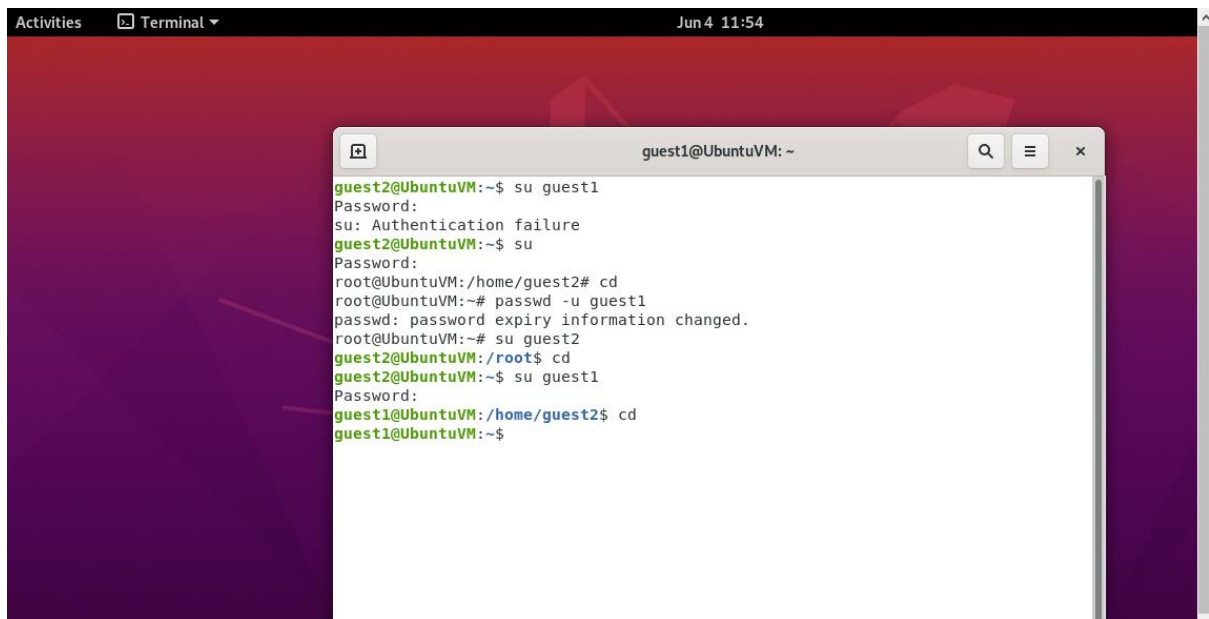
To verify that the password was locked and guest1 could not login, I tried logging in from guest2 with the password, but access/ authentication failed.



```
guest2@UbuntuVM:~$ su guest1
Password:
su: Authentication failure
guest2@UbuntuVM:~$
```



I re-enabled the password for guest1 so they could login again and verified.



The image shows a terminal window titled "Terminal" with a date and time of "Jun 4 11:54". The terminal output is as follows:

```
guest2@UbuntuVM:~$ su guest1
Password:
su: Authentication failure
guest2@UbuntuVM:~$ su
Password:
root@UbuntuVM:/home/guest2# cd
root@UbuntuVM:~# passwd -u guest1
passwd: password expiry information changed.
root@UbuntuVM:~# su guest2
guest2@UbuntuVM:/root$ cd
guest2@UbuntuVM:~$ su guest1
Password:
guest1@UbuntuVM:/home/guest2$ cd
guest1@UbuntuVM:~$
```