ARPIT SAGAR

Assignment – Memory Management

1) Setup additional swap space in the system to solve low memory issue. The swap which you added should be available post reboot.

2) Find out the number of process is in run queue and blocking queue.

Solution: 1

```
ubuntu@ip-172-31-44-14:~$ free -h
               total        used        free      shared  buff/cache   available
Mem:           914Mi       341Mi       361Mi       2.7Mi       365Mi       572Mi
Swap:             0B          0B          0B
```

First checked for memory and swap usage.
Swap contents are zero, which means no swap is active.

```
ubuntu@ip-172-31-44-14:~$ sudo fallocate -l 2G /swapfile
```

Allocate 2GB space file named “swapfile” at the root dir (-l: size of file).

```
ubuntu@ip-172-31-44-14:~$ sudo chmod 600 /swapfile
```

Set permissions so that only root has access to read and write. (6: read (4) + write (2))
This is done for security reasons to not allow others to access to swap files.

```
ubuntu@ip-172-31-44-14:~$ sudo getfacl /swapfile
getfacl: Removing leading '/' from absolute path names
# file: swapfile
# owner: root
# group: root
user::rw-
group::---
other::---
```

Checked whether permissions are set correctly and verified.

```
ubuntu@ip-172-31-44-14:~$ sudo mkswap /swapfile
Setting up swapspace version 1, size = 2 GiB (2147479552 bytes)
no label, UUID=9c1689fe-ffb3-4346-a249-2a13cad201df
ubuntu@ip-172-31-44-14:~$ sudo swapon /swapfile
ubuntu@ip-172-31-44-14:~$ swapon --show
NAME      TYPE SIZE USED PRIO
/swapfile file   2G   0B   -2
ubuntu@ip-172-31-44-14:~$ free -h
               total        used        free      shared  buff/cache   available
Mem:           914Mi       346Mi       250Mi       2.7Mi       475Mi       568Mi
Swap:          2.0Gi          0B       2.0Gi
ubuntu@ip-172-31-44-14:~$ sudo tee -a /etc/fstab
```

Now, marked that “swapfile” is prepared to be used as swap using “mkswap”
Then, activated the “swapfile” using “swapon” which makes sure that “swapfile” can now be used as swap space.
And using “swapon --show” or “free -h” we checked that we have successfully created a swap memory of 2GB.

To make sure it is permanent even after the reboot used “sudo tee -a/fstab”, (“tee”: cmd that reads from std ip and writes to a file and “-a” means append) which opens a “/etc/fstab” config file where swap files are defined permanently.

```
ubuntu@ip-172-31-44-14:~$ sudo tee -a /etc/fstab
/swapfile none swap sw 0 0
/swapfile none swap sw 0 0
ubuntu@ip-172-31-44-14:~$ cat /etc/fstab
LABEL=cloudimg-rootfs   /        ext4   discard,commit=30,errors=remount-ro 0
 1
LABEL=BOOT      /boot   ext4    defaults        0 2
LABEL=UEFI      /boot/efi       vfat    umask=0077      0 1
/swapfile none swap sw 0 0
ubuntu@ip-172-31-44-14:~$ sudo swapoff -a
ubuntu@ip-172-31-44-14:~$ swapon --show
ubuntu@ip-172-31-44-14:~$ sudo swapon --show
ubuntu@ip-172-31-44-14:~$ sudo swapoff -a
ubuntu@ip-172-31-44-14:~$ sudo swapon --show
ubuntu@ip-172-31-44-14:~$ sudo swapon -a
ubuntu@ip-172-31-44-14:~$ sudo swapon --show
NAME      TYPE SIZE USED PRIO
/swapfile file   2G   0B   -2
ubuntu@ip-172-31-44-14:~$
```

After then write “swapfile none swap sw 0 0” and its done. (ctrl + d to save it and exit).
Now using “swapoff -a” and “swapon -a” we can check the swap memory in usage and activation.

Solution: 2

```
ubuntu@ip-172-31-44-14:~$ vmstat
procs -----------memory---------- ---swap-- -----io---- -system-- -------cpu-------
 r  b   swpd   free   buff  cache   si   so    bi    bo   in   cs us sy id wa st gu
 1  0      0 230840  24068 490016    0    0   135    33   49    0  0  0 99  0  0  0
ubuntu@ip-172-31-44-14:~$
```

Using “vmstat”, which shows system performance statisstics we can have a full overview about current processes, memory and swap usage, ip/op operations, system and cpu usage.
Under “procs”, “r” and “b” where r: no. of processes in run queue and b: no. of processes in block queue.
So, here no. of processes in running queue is 1 and no process is there in block queue.