Exercise :- Advance Linux Assignment

1. What is the size of MBR and what does it contains.
2. In which file you can write commands which you want to run whenever Linux system starts/restarts?
3. Reboot the system using runlevel.
4. Restart cron service.
5. Create an ext4 filesystem
6. Mount the created filesystem on /partition directory.
7. Difference between LVM and RAID.
8. Create a LVM(Slide 13)
9. Create a RAID1 device(Slide 19)
10. Create a swapfile of 500Mb(slide20)
11. Set setuid and setgid on two different file.
12. What is the use of Sticky bit.
13. Create a user and add it to one secondary group.
14. Lock this user.
15. Give this user full access (without password).
16. Delete the create user after taking backup of it home directory.
17. Create a file with some content. Change all lower case letter to upper case letter and save output to another file using redirections.
18. Set nice value of a process to -1.
19. Get list of all files used by "telnet".
20. Check if port 22 is listening using netstat and telnet command.
21. Create a cron job which runs once in a week at 23:45.
22. Difference between dig and traceroute

Question 1: What is the size of MBR and what does it contains.

Solution 1:

MBR :- 512 bytes

- MBR stands for Master Boot Record.
- It is located in the 1st sector of the bootable disk. Typically /dev/hda, or /dev/sda
- MBR is less than 512 bytes in size. This has three components 1) primary boot loader info in 1st 446 bytes 2) partition table info in next 64 bytes 3) mbr validation check in last 2 bytes.
- It contains information about GRUB (or LILO in old systems).
- So, in simple terms MBR loads and executes the GRUB boot loader.

---- primary boot loader 446 bytes
---- partition table 64 bytes

---- MBR signature 2 bytes

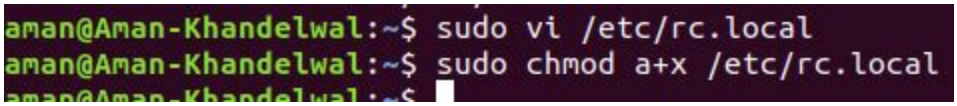
Question 2: In which file you can write commands which you want to run whenever Linux system starts/restarts?

Solution 2:

rc.local is a legacy from the System V init system where it is the last script to be executed before proceeding to a login screen for the desktop environment or a login prompt at terminal.

- Create or Open rc.local
  # sudo vi /etc/rc.local
- Give executable permission to this file
  # chmod a+x /etc/rc.local

Other than this we can use systemctl command to enable any service to start at the boot time.



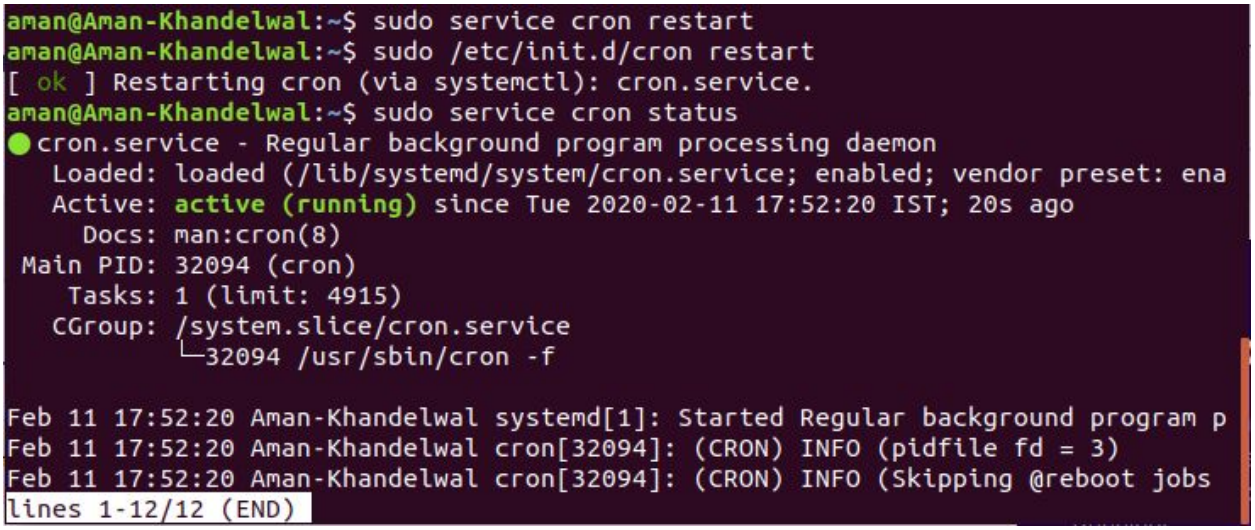
Question 3: Reboot the system using runlevel.

Solution 3:

Change runlevel for reboot : - sudo init 6
Check Current level : - runlevel

Question 4: Restart cron service.

Solution 4:



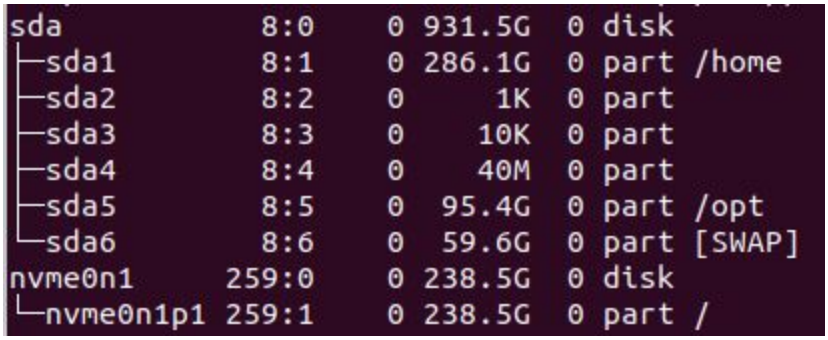
#sudo /etc/init.d/cron
Or
#sudo service restart

Question 5: Create an ext4 filesystem

Solution 5:

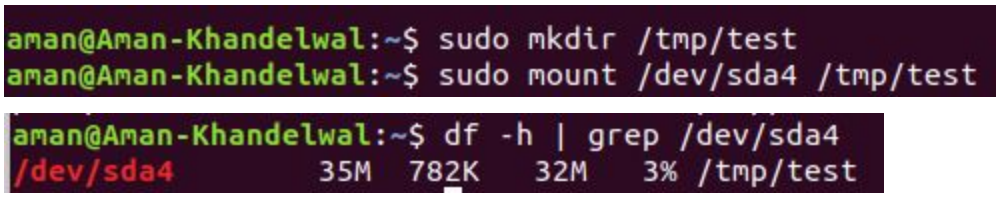
```
aman@Aman-Khandelwal:~$ sudo fdisk /dev/sda
[sudo] password for aman:

Welcome to fdisk (util-linux 2.31.1).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.


Command (m for help): p
Disk /dev/sda: 931.5 GiB, 1000204886016 bytes, 1953525168 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 4096 bytes
I/O size (minimum/optimal): 4096 bytes / 4096 bytes
Disklabel type: dos
Disk identifier: 0x53e7ba54

Device     Boot     Start       End   Sectors   Size Id Type
/dev/sda1             2048 600000511 599998464 286.1G 83 Linux
/dev/sda2        600002558 924999679 324997122   155G  5 Extended
/dev/sda3        600000512 600000531        20    10K 83 Linux
/dev/sda5        600002560 799999999 199997440  95.4G 83 Linux
/dev/sda6        800002048 924999679 124997632  59.6G 82 Linux swap / Solaris

Partition 2 does not start on physical sector boundary.

Partition table entries are not in disk order.

Command (m for help): n
Partition type
   p   primary (2 primary, 1 extended, 1 free)
```

```
Partition table entries are not in disk order.

Command (m for help): n
Partition type
   p   primary (2 primary, 1 extended, 1 free)
   l   logical (numbered from 5)
Select (default p):

Using default response p.
Selected partition 4
First sector (600000532-1953525167, default 924999680):
Last sector, +sectors or +size{K,M,G,T,P} (924999680-1953525167, default 1953525167): +40M

Created a new partition 4 of type 'Linux' and of size 40 MiB.

Command (m for help): w
The partition table has been altered.
Syncing disks.
```



Question 6: Mount the created filesystem on /partition directory.

Solution 6:



Question 7: Difference between LVM and RAID.

Solution 7:

RAID:

RAID is used for redundancy.

A RAID device is a physical grouping of disk devices in order to create a logical presentation of one device to an Operating System for redundancy or performance or a combination of the two.

LVM :

LVM is a way in which you partition the hard disk logically and it contains its own advantages.

LVM is a logical layer that that can be anipulated in order to create and, or expand a logical presentation of a disk device to an Operating System.

Question 8: Create a LVM(Slide 13)

Solution 8:

```
Device     Boot     Start       End   Sectors   Size Id Type
/dev/sda1            2048 600000511 599998464 286.1G 83 Linux
/dev/sda2       600002558 924999679 324997122   155G  5 Extended
/dev/sda3       600000512 600000531        20    10K 83 Linux
/dev/sda5       600002560 799999999 199997440  95.4G 83 Linux
/dev/sda6       800002048 924999679 124997632  59.6G 82 Linux swap / Solaris

Partition 2 does not start on physical sector boundary.

Partition table entries are not in disk order.

Command (m for help): n
Partition type
   p   primary (2 primary, 1 extended, 1 free)
   l   logical (numbered from 5)
Select (default p): p

Selected partition 4
First sector (600000532-1953525167, default 924999680):
Last sector, +sectors or +size{K,M,G,T,P} (924999680-1953525167, default 1953525167): +2G

Created a new partition 4 of type 'Linux' and of size 2 GiB.
```

```
aman@Aman-Khandelwal:~/Desktop/test$ sudo pvcreate /dev/sda3 /dev/sda4
  Device /dev/sda3 excluded by a filter.
WARNING: ext4 signature detected on /dev/sda4 at offset 1080. Wipe it? [y/n]: y
  Wiping ext4 signature on /dev/sda4.
  Physical volume "/dev/sda4" successfully created.
```

```
aman@Aman-Khandelwal:~/Desktop/test$ sudo pvscan
  PV /dev/sda4                      lvm2 [2.00 GiB]
  Total: 1 [2.00 GiB] / in use: 0 [0   ] / in no VG: 1 [2.00 GiB]
```

```
aman@Aman-Khandelwal:~/Desktop/test$ sudo vgcreate vol_grp1 /dev/sda4
  Volume group "vol_grp1" successfully created
aman@Aman-Khandelwal:~/Desktop/test$ sudo vgscan
  Reading volume groups from cache.
  Found volume group "vol_grp1" using metadata type lvm2
```

```
aman@Aman-Khandelwal:~/Desktop/test$ sudo lvcreate -l 10 -n log_vol1 vol_grp1
  Logical volume "log_vol1" created.
aman@Aman-Khandelwal:~/Desktop/test$ sudo mkfs.ext4 /dev/vol_grp1/log_vol1
mke2fs 1.44.1 (24-Mar-2018)
Discarding device blocks: done
Creating filesystem with 40960 1k blocks and 10240 inodes
Filesystem UUID: 46942394-93c7-436e-a88b-72f04d45d75e
Superblock backups stored on blocks:
        8193, 24577

Allocating group tables: done
Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystem accounting information: done

aman@Aman-Khandelwal:~/Desktop/test$ sudo lvscan
  ACTIVE            '/dev/vol_grp1/log_vol1' [40.00 MiB] inherit
aman@Aman-Khandelwal:~/Desktop/test$
```

Question 9: Create a RAID1 device(Slide 19)

Solution 9:

```
aman@Aman-Khandelwal:~$ sudo mdadm --create --verbose /dev/md0 --level=0 --raid-
devices=2 /dev/sda4 /dev/sda3
mdadm: chunk size defaults to 512K
mdadm: Defaulting to version 1.2 metadata
mdadm: array /dev/md0 started.
```

```
aman@Aman-Khandelwal:~$ sudo mdadm --detail /dev/md0
/dev/md0:
           Version : 1.2
     Creation Time : Wed Feb 12 15:26:53 2020
        Raid Level : raid0
        Array Size : 2091520 (2042.50 MiB 2141.72 MB)
      Raid Devices : 2
     Total Devices : 2
       Persistence : Superblock is persistent

       Update Time : Wed Feb 12 15:26:53 2020
             State : clean
    Active Devices : 2
   Working Devices : 2
    Failed Devices : 0
     Spare Devices : 0

        Chunk Size : 512K

Consistency Policy : none

              Name : Aman-Khandelwal:0  (local to host Aman-Khandelwal)
              UUID : cb030da3:03cf7b6f:5b318f32:ded0ae40
            Events : 0

    Number   Major   Minor   RaidDevice State
       0       8        4        0      active sync   /dev/sda4
       1       8        3        1      active sync   /dev/sda3
```

```
aman@Aman-Khandelwal:~$ sudo mkfs.ext4 /dev/md0
mke2fs 1.44.1 (24-Mar-2018)
Discarding device blocks: done
Creating filesystem with 522880 4k blocks and 130816 inodes
Filesystem UUID: 310a1b97-8cca-43ef-b53d-a837824666de
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912

Allocating group tables: done
Writing inode tables: done
Creating journal (8192 blocks): done
Writing superblocks and filesystem accounting information: done
```

Question 10: Create a swapfile of 500Mb(slide20)

Solution 10:

-- Check swap :

#sudo swapon -s

-- Create a Swap File:
#sudo fallocate -l 500M /swapfile

-- Set up the swap space:

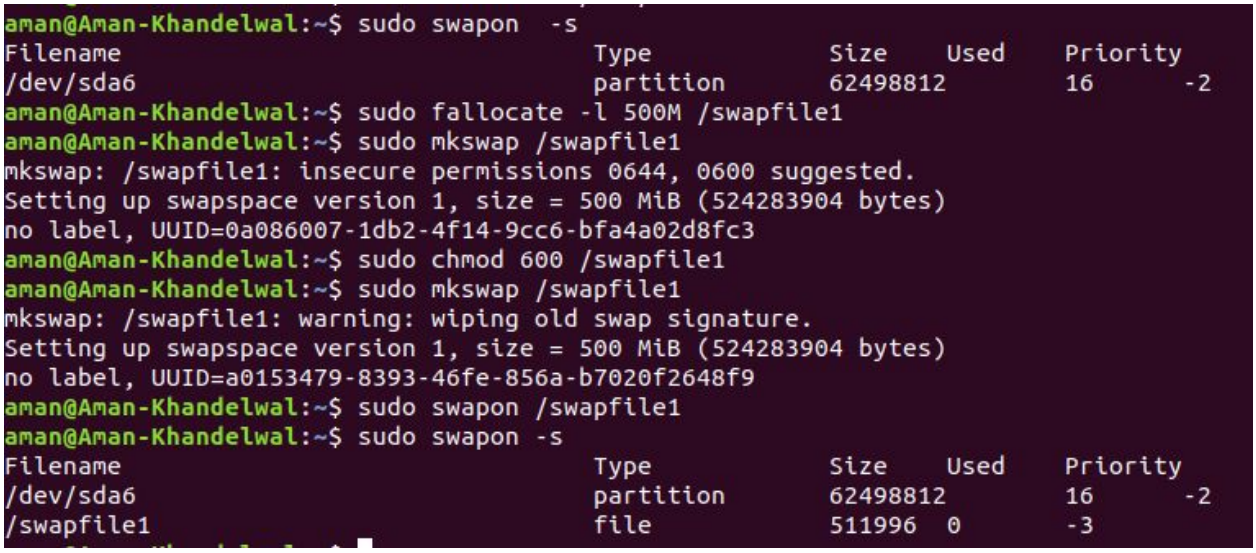
#sudo mkswap /swapfile

-- Enable swap space:

#sudo swapon /swapfile

-- Verify swap space:

#swapon -s



Question 11: Set setuid and setgid on two different file.

Solution 11:

```
aman@Aman-Khandelwal:~/Desktop/test$ ls -l
total 8
-rw-r--r-- 1 aman aman  6 Feb  5 15:36 logs
-rw-rw-r-- 1 aman aman 29 Feb  5 21:29 new
aman@Aman-Khandelwal:~/Desktop/test$ chmod u+s logs
aman@Aman-Khandelwal:~/Desktop/test$ chmod g+s new
aman@Aman-Khandelwal:~/Desktop/test$ ls -l
total 8
-rwSr--r-- 1 aman aman  6 Feb  5 15:36 logs
-rw-rwSr-- 1 aman aman 29 Feb  5 21:29 new
```

Question 12: What is the use of Sticky bit.

Solution 12:

```
aman@Aman-Khandelwal:~/Desktop$ ls -l | grep test
drwxr-xr-x  3 aman aman  4096 Feb 12 10:16 test
aman@Aman-Khandelwal:~/Desktop$ chmod +t test/
aman@Aman-Khandelwal:~/Desktop$ ls -l | grep test
drwxr-xr-t  3 aman aman  4096 Feb 12 10:16 test
```

Question 13: Create a user and add it to one secondary group.

Solution 13:

```
aman@Aman-Khandelwal:~$ groups test
test : test
aman@Aman-Khandelwal:~$ id test
uid=1001(test) gid=1001(test) groups=1001(test)
aman@Aman-Khandelwal:~$ sudo addgroup newers
Adding group `newers' (GID 1002) ...
Done.
aman@Aman-Khandelwal:~$ sudo usermod -a -G newers test
aman@Aman-Khandelwal:~$ id test
uid=1001(test) gid=1001(test) groups=1001(test),1002(newers)
aman@Aman-Khandelwal:~$
```

Question 14: Lock this user.

Solution 14:

```
aman@Aman-Khandelwal:~$ sudo usermod -L test
aman@Aman-Khandelwal:~$ sudo passwd -S test
test L 02/12/2020 0 99999 7 -1
aman@Aman-Khandelwal:~$ sudo usermod -U test
aman@Aman-Khandelwal:~$ sudo passwd -S test
test P 02/12/2020 0 99999 7 -1
aman@Aman-Khandelwal:~$
```

Question 15: Give this user full access (without password).

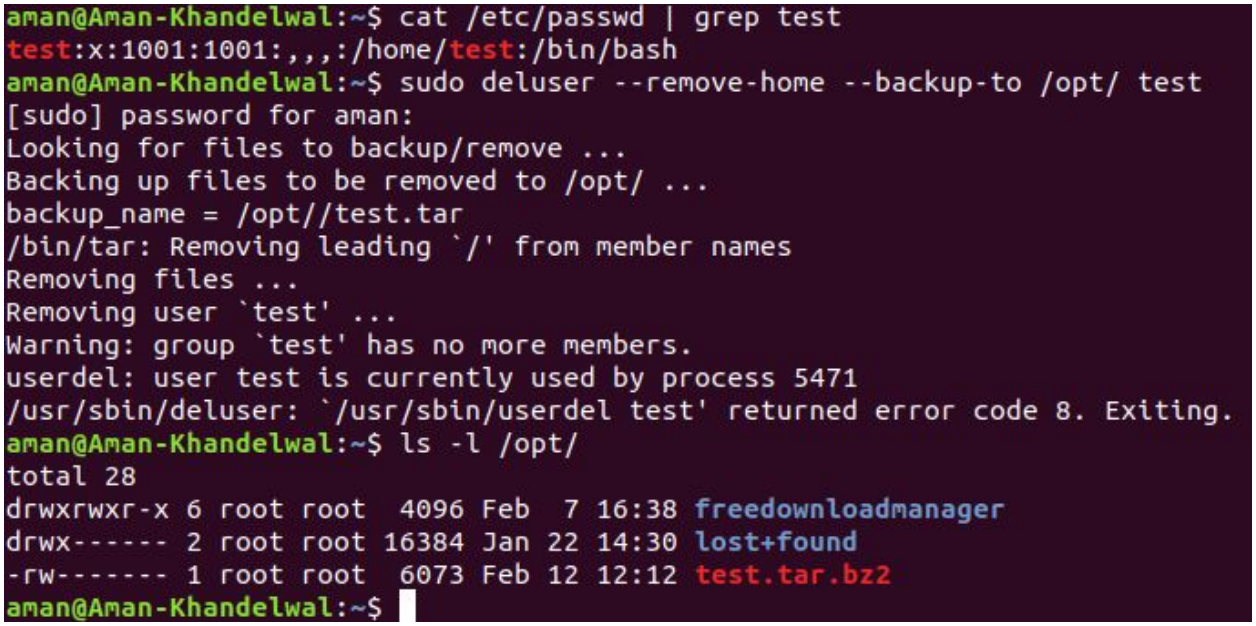
Solution 15:

```
                                                aman@Aman-Khandelwal: ~
File  Edit  View  Search  Terminal  Help
  GNU nano 2.9.3                                /etc/sudoers.tmp


# User alias specification

# Cmnd alias specification

# User privilege specification
root    ALL=(ALL:ALL) ALL
test ALL=(ALL) NOPASSWD: ALL
# Members of the admin group may gain root privileges
%admin ALL=(ALL) ALL

# Allow members of group sudo to execute any command
%sudo   ALL=(ALL:ALL) ALL

# See sudoers(5) for more information on "#include" directives:

#includedir /etc/sudoers.d
```

```
test@Aman-Khandelwal:/home/aman$ mkdir /etc/xyz
mkdir: cannot create directory ‘/etc/xyz’: Permission denied
test@Aman-Khandelwal:/home/aman$ sudo mkdir /etc/xyz
test@Aman-Khandelwal:/home/aman$ ls -l | grep xyz
test@Aman-Khandelwal:/home/aman$ ls -l /etc/ | grep xyz
drwxr-xr-x  2 root root    4096 Feb 12 11:53 xyz
test@Aman-Khandelwal:/home/aman$
```

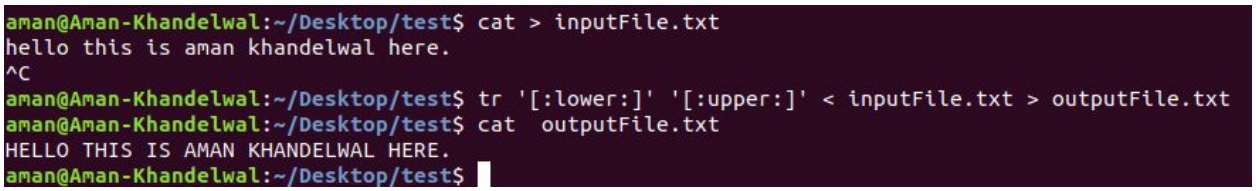
Question 16: Delete the create user after taking backup of it home directory.

Solution 16:



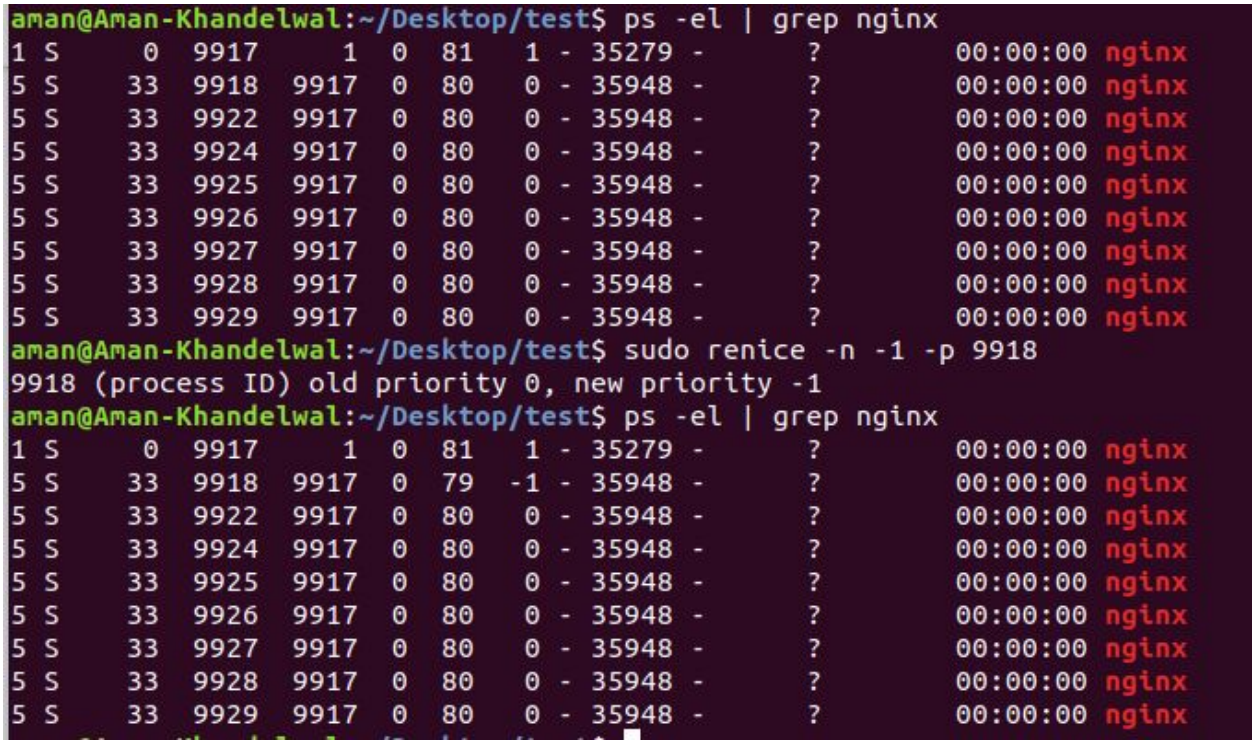
Question 17: Create a file with some content. Change all lower case letter to upper case letter and save output to another file using redirections.

Solution 17:



Question 18: Set nice value of a process to -1.

Solution 18:



Question 19: Get list of all files used by “telnet”.

Solution 19:

Question 20: Check if port 22 is listening using netstat and telnet command.

Solution 20:

```
aman@Aman-Khandelwal:~/Desktop/test$ netstat -ntlp
(Not all processes could be identified, non-owned process info
 will not be shown, you would have to be root to see it all.)
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
tcp        0      0 127.0.0.53:53           0.0.0.0:*               LISTEN      -
tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN      -
tcp        0      0 127.0.0.1:631           0.0.0.0:*               LISTEN      -
tcp        0      0 127.0.0.1:3306          0.0.0.0:*               LISTEN      -
tcp        0      0 0.0.0.0:80              0.0.0.0:*               LISTEN      -
tcp6       0      0 :::22                   :::*                    LISTEN      -
tcp6       0      0 ::1:631                 :::*                    LISTEN      -
tcp6       0      0 :::80                   :::*                    LISTEN      -
aman@Aman-Khandelwal:~/Desktop/test$ netstat -ntlp | grep 22
(Not all processes could be identified, non-owned process info
 will not be shown, you would have to be root to see it all.)
tcp        0      0 0.0.0.0:22              0.0.0.0:*               LISTEN      -
tcp6       0      0 :::22                   :::*                    LISTEN      -
```

```
aman@Aman-Khandelwal:~/Desktop/test$ telnet localhost 22
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
SSH-2.0-OpenSSH_7.6p1 Ubuntu-4ubuntu0.3
```

Question 21: Create a cron job which runs once in a week at 23:45.

Solution 21

```
                                                aman@Aman-Khandelwal: ~/Desktop/test
File  Edit  View  Search  Terminal  Help
  GNU nano 2.9.3                                /tmp/crontab.1vDmIQ/crontab

# 0 5 * * 1 tar -zcf /var/backups/home.tgz /home/
#
# For more information see the manual pages of crontab(5) and cron(8)
#
# m h  dom mon dow   command

45 23 * * 1 /usr/bin/echo “hello everyone”
```

```
aman@Aman-Khandelwal:~/Desktop/test$ sudo crontab -e
crontab: installing new crontab
aman@Aman-Khandelwal:~/Desktop/test$ sudo crontab -l

45 23 * * 1 /usr/bin/echo “hello everyone”
```

Question 22: Difference between dig and traceroute

Solution 22:

```
aman@Aman-Khandelwal: ~/Desktop/test
File  Edit  View  Search  Terminal  Help
aman@Aman-Khandelwal:~/Desktop/test$ traceroute www.amazon.com
traceroute to www.amazon.com (13.35.220.116), 30 hops max, 60 byte packets
 1  _gateway (10.1.208.1)  5.832 ms  5.782 ms  5.742 ms
 2  static-217.91.12.61-tataidc.co.in (61.12.91.217)  9.425 ms  9.391 ms  9.369 ms
 3  10.124.210.165 (10.124.210.165)  12.849 ms  12.800 ms  12.799 ms
 4  * * *
 5  10.43.147.42 (10.43.147.42)  9.136 ms  9.122 ms  9.090 ms
 6  14.141.116.253.static-Delhi.vsnl.net.in (14.141.116.253)  305.547 ms  202.299 ms  202.264 ms
 7  172.31.169.86 (172.31.169.86)  202.243 ms  229.654 ms  229.537 ms
 8  172.31.187.49 (172.31.187.49)  229.458 ms  229.346 ms  229.321 ms
 9  115.110.232.198.static.Delhi.vsnl.net.in (115.110.232.198)  229.205 ms  229.206 ms  229.185 ms
10  52.93.98.140 (52.93.98.140)  229.155 ms 52.93.98.128 (52.93.98.128)  229.155 ms 52.93.98.136 (52.93.98.136)  229.092 ms
11  52.93.116.201 (52.93.116.201)  229.107 ms 52.93.116.209 (52.93.116.209)  229.068 ms 52.93.116.215 (52.93.116.215)  180.577 ms
12  * * *
13  * * *
14  * * *
15  * * *
16  * * *
17  server-13-35-220-116.del54.r.cloudfront.net (13.35.220.116)  7.496 ms  9.492 ms  9.459 ms
aman@Aman-Khandelwal:~/Desktop/test$
```

```
aman@Aman-Khandelwal:~/Desktop/test$ dig www.amazon.com

; <<>> DiG 9.11.3-1ubuntu1.11-Ubuntu <<>> www.amazon.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 21347
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;www.amazon.com.                        IN      A

;; ANSWER SECTION:
www.amazon.com.         478     IN      CNAME   tp.47cf2c8c9-frontier.amazon.com.
tp.47cf2c8c9-frontier.amazon.com. 58 IN CNAME   d3ag4hukkh62yn.cloudfront.net.
d3ag4hukkh62yn.cloudfront.net. 58 IN    A       13.35.220.116

;; Query time: 91 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Wed Feb 12 14:15:18 IST 2020
;; MSG SIZE  rcvd: 138
```