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

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

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.

```
aman@Aman-Khandelwal:~$ sudo vi /etc/rc.local
aman@Aman-Khandelwal:~$ sudo chmod a+x /etc/rc.local
```

Solution 3:

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

```
aman@Aman-Khandelwal:~$ sudo init 6
```

Solution 4:

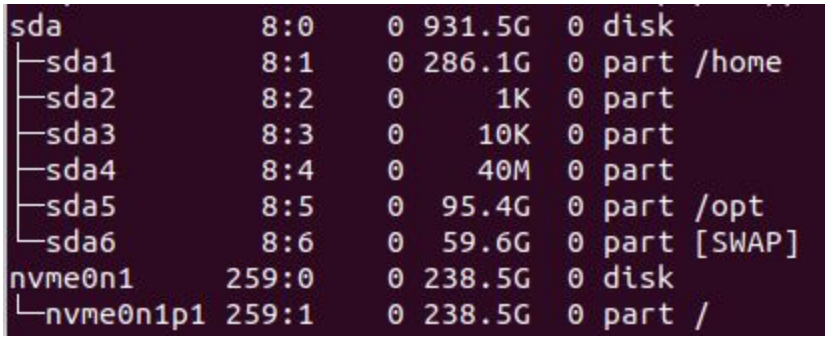
```
aman@Aman-Khandelwal:~$ sudo service cron restart
aman@Aman-Khandelwal:~$ sudo /etc/init.d/cron restart
[ ok ] Restarting cron (via systemctl): cron.service.
aman@Aman-Khandelwal:~$ sudo service cron status
● cron.service - Regular background program processing daemon
   Loaded: loaded (/lib/systemd/system/cron.service; enabled; vendor preset: ena
   Active: active (running) since Tue 2020-02-11 17:52:20 IST; 20s ago
     Docs: man:cron(8)
 Main PID: 32094 (cron)
    Tasks: 1 (limit: 4915)
   CGroup: /system.slice/cron.service
           └─32094 /usr/sbin/cron -f

Feb 11 17:52:20 Aman-Khandelwal systemd[1]: Started Regular background program p
Feb 11 17:52:20 Aman-Khandelwal cron[32094]: (CRON) INFO (pidfile fd = 3)
Feb 11 17:52:20 Aman-Khandelwal cron[32094]: (CRON) INFO (Skipping @reboot jobs
lines 1-12/12 (END)
```

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

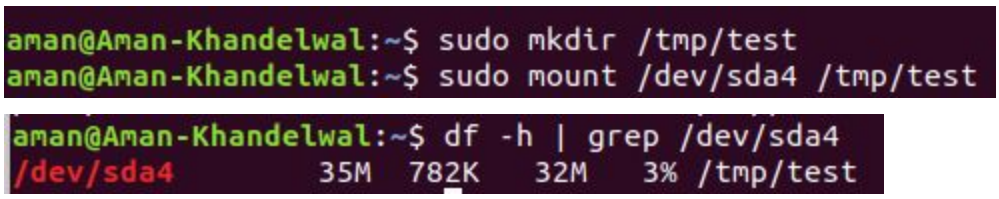
Solution 5:

```
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.
```



Solution 6:



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.

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$
```

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
```

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

```
aman@Aman-Khandelwal:~$ sudo swapon  -s
Filename                                Type            Size    Used    Priority
/dev/sda6                               partition       62498812        16      -2
aman@Aman-Khandelwal:~$ sudo fallocate -l 500M /swapfile1
aman@Aman-Khandelwal:~$ sudo mkswap /swapfile1
mkswap: /swapfile1: insecure permissions 0644, 0600 suggested.
Setting up swapspace version 1, size = 500 MiB (524283904 bytes)
no label, UUID=0a086007-1db2-4f14-9cc6-bfa4a02d8fc3
aman@Aman-Khandelwal:~$ sudo chmod 600 /swapfile1
aman@Aman-Khandelwal:~$ sudo mkswap /swapfile1
mkswap: /swapfile1: warning: wiping old swap signature.
Setting up swapspace version 1, size = 500 MiB (524283904 bytes)
no label, UUID=a0153479-8393-46fe-856a-b7020f2648f9
aman@Aman-Khandelwal:~$ sudo swapon /swapfile1
aman@Aman-Khandelwal:~$ sudo swapon -s
Filename                                Type            Size    Used    Priority
/dev/sda6                               partition       62498812        16      -2
/swapfile1                              file            511996  0       -3
```

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
```

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
```

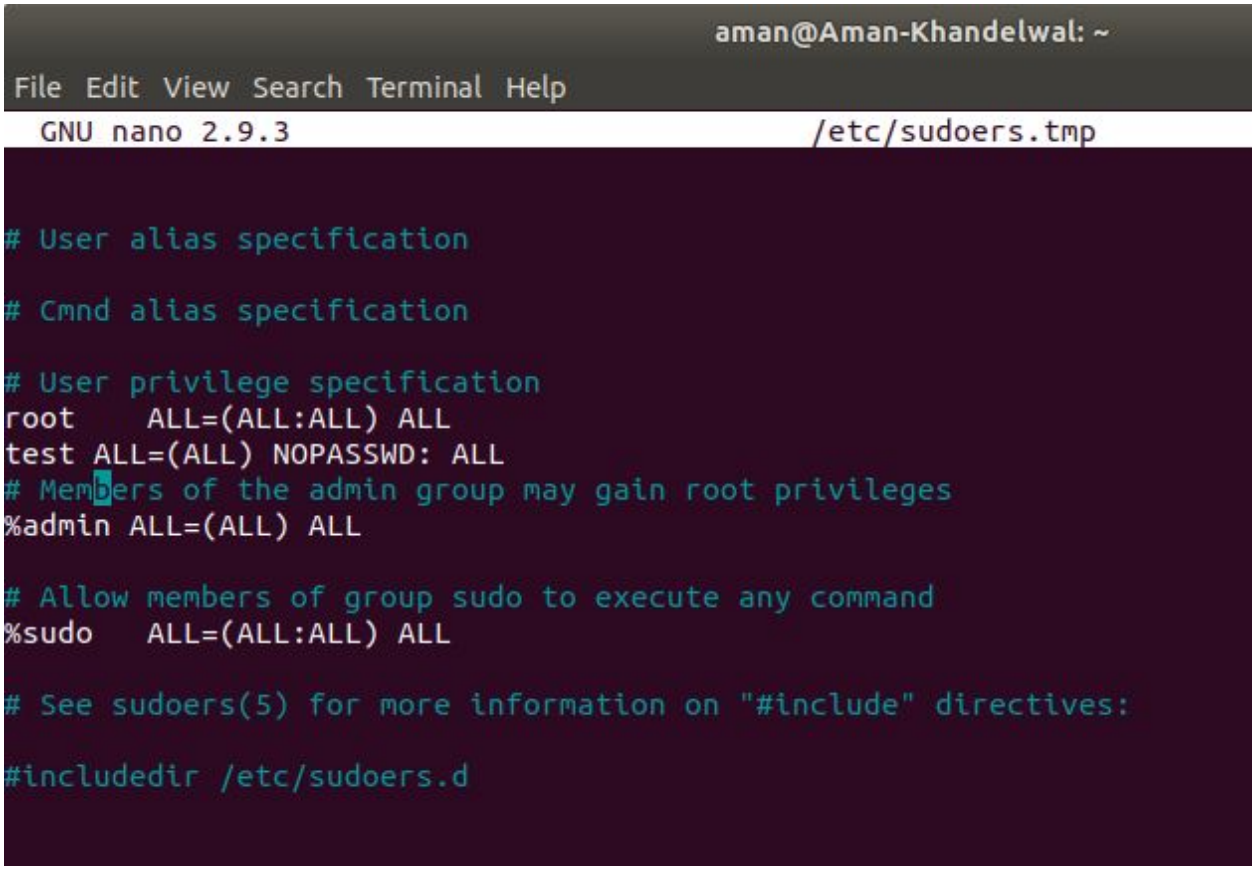
Solution 13:

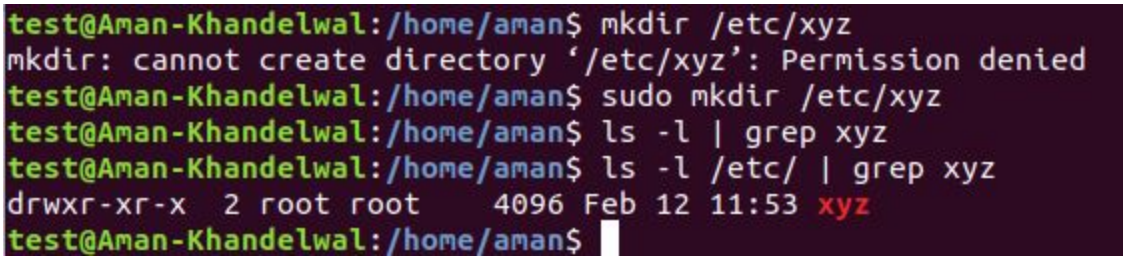
```
aman@Aman-Khandelwal:~$ groups test
test : test
aman@Aman-Khandelwal:~$ id test
uid=1001(test) gid=1001(test) groups=1001(test)
aman@Aman-Khandelwal:~$ sudo addgroup newers
Adding group `newers' (GID 1002) ...
Done.
aman@Aman-Khandelwal:~$ sudo usermod -a -G newers test
aman@Aman-Khandelwal:~$ id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

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:~$
```

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$

Solution 16:

```
aman@Aman-Khandelwal:~$ cat /etc/passwd | grep test
test:x:1001:1001:,,,:/home/test:/bin/bash
aman@Aman-Khandelwal:~$ sudo deluser --remove-home --backup-to /opt/ test
[sudo] password for aman:
Looking for files to backup/remove ...
Backing up files to be removed to /opt/ ...
backup_name = /opt//test.tar
/bin/tar: Removing leading `/' from member names
Removing files ...
Removing user `test' ...
Warning: group `test' has no more members.
userdel: user test is currently used by process 5471
/usr/sbin/deluser: `/usr/sbin/userdel test' returned error code 8. Exiting.
aman@Aman-Khandelwal:~$ ls -l /opt/
total 28
drwxrwxr-x 6 root root  4096 Feb  7 16:38 freedownloadmanager
drwx------ 2 root root 16384 Jan 22 14:30 lost+found
-rw------- 1 root root  6073 Feb 12 12:12 test.tar.bz2
aman@Aman-Khandelwal:~$
```

Solution 17:

```
aman@Aman-Khandelwal:~/Desktop/test$ cat > inputFile.txt
hello this is aman khandelwal here.
^C
aman@Aman-Khandelwal:~/Desktop/test$ tr '[:lower:]' '[:upper:]' < inputFile.txt > outputFile.txt
aman@Aman-Khandelwal:~/Desktop/test$ cat  outputFile.txt
HELLO THIS IS AMAN KHANDELWAL HERE.
aman@Aman-Khandelwal:~/Desktop/test$
```

Solution 18:

```
aman@Aman-Khandelwal:~/Desktop/test$ ps -el | grep nginx
1 S     0  9917     1  0  81   1 - 35279 -      ?        00:00:00 nginx
5 S    33  9918  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
5 S    33  9922  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
5 S    33  9924  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
5 S    33  9925  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
5 S    33  9926  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
5 S    33  9927  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
5 S    33  9928  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
5 S    33  9929  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
aman@Aman-Khandelwal:~/Desktop/test$ sudo renice -n -1 -p 9918
9918 (process ID) old priority 0, new priority -1
aman@Aman-Khandelwal:~/Desktop/test$ ps -el | grep nginx
1 S     0  9917     1  0  81   1 - 35279 -      ?        00:00:00 nginx
5 S    33  9918  9917  0  79  -1 - 35948 -      ?        00:00:00 nginx
5 S    33  9922  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
5 S    33  9924  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
5 S    33  9925  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
5 S    33  9926  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
5 S    33  9927  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
5 S    33  9928  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
5 S    33  9929  9917  0  80   0 - 35948 -      ?        00:00:00 nginx
```

Solution 19:

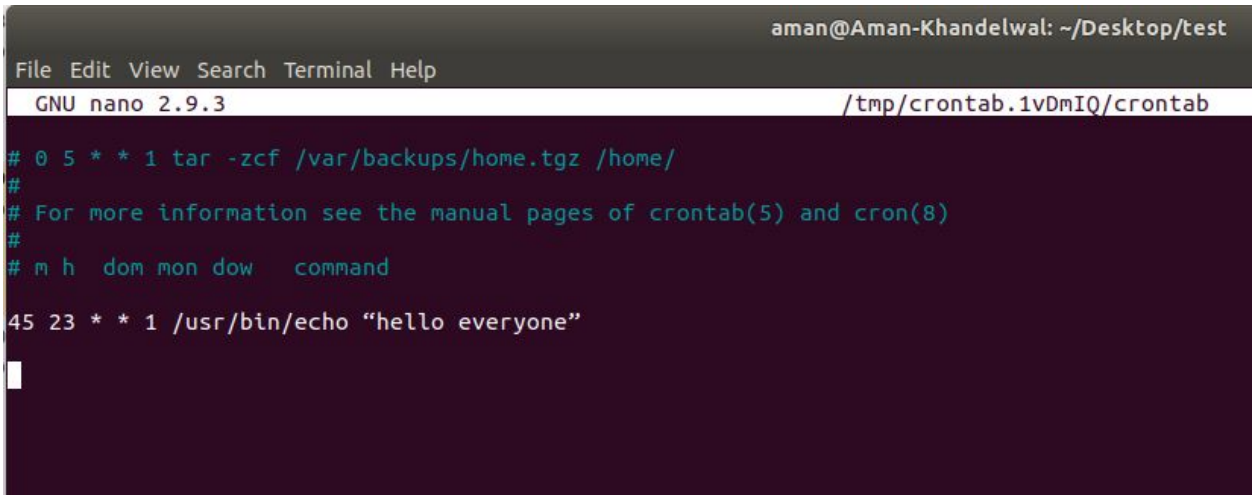
```
aman@Aman-Khandelwal:~/Desktop/test$ ps -el | grep telnet
0 S  1000 12927 12913  0  80   0 -  5660 wait_w pts/1    00:00:00 telnet
aman@Aman-Khandelwal:~/Desktop/test$ whereis telnet
telnet: /usr/bin/telnet.netkit /usr/bin/telnet /usr/share/man/man1/telnet.1.gz
```

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      -
```

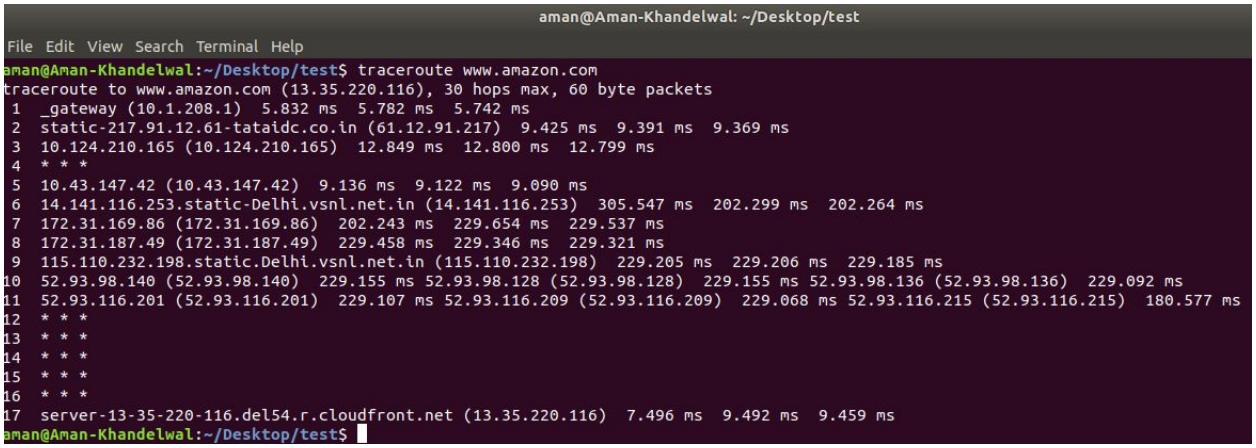
```
aman@Aman-Khandelwal:~/Desktop/test$ telnet localhost 22
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^]'.
SSH-2.0-OpenSSH_7.6p1 Ubuntu-4ubuntu0.3
```

Solution 21




```
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”
```

Solution 22:



```
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
```