1. What is the size of MBR and what does it contain?
   => Size of MBR is 512 bytes and it contains boot loader (446 bytes), partition table (64 bytes) and magic number (2 bytes).

2. In which file you can write commands which you want to run whenever Linux system starts/restarts?
   => We can write commands in rc.local file in /etc to run whenever Linux system starts/restarts.

3. Reboot the system using runlevel.
   => $init 6

4. Restart cron service.
   => $ service cron restart

5. Create an ext4 filesystem
   => $mkfs –t ext4 /dev/xvda

6. Mount the created filesystem on /partition directory.
   => $ mkdir /partition
      $ mount /dev/xvda /partition

7. Difference between LVM and RAID.
   => 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 whereas, LVM is a logical layer that can be manipulated in order to create and, or expand a logical presentation of a disk device to an Operating System.

8. Create a LVM(Slide 13)
   => -Select the Physical Storage Devices for LVM
      $pvcreate /dev/sda1 /dev/sda2
      -Create the Volume Group
      $vgcreate vol_grp1 /dev/sda1 /dev/sda2
      -Create Logical Volumes
      $lvcreate -l 20 -n logical_vol1 vol_grp1

9. Create a RAID1 device(Slide 19)
   => **Installation**: apt-get install mdadm rsync initramfs-tools
   Create partitions : using fdisk on say /dev/sdb and /dev/sdc
   Verify the changes : mdadm -E /dev/sd[b-c]
   Create RAID1 Device
   mdadm --create /dev/md0 --level=mirror --raid-devices=2 /dev/sd[b-c]1

10. Create a swapfile of 500Mb(slide20)
    =>creates a file of a preallocated size instantly, without actually having to write dummy contents
    $ fallocate -l 500M /swapfile
    $ mkswap /swapfile
    $swapon /swapfile

11. Set setuid and setgid on two different files.

```
ayush@ayush:~$ touch file1
ayush@ayush:~$ ls -l file1
-rw-r--r-- 1 ayush ayush 0 Feb 13 14:58 file1
ayush@ayush:~$ chmod u+s file1
ayush@ayush:~$ ls -l file1
-rwSr--r-- 1 ayush ayush 0 Feb 13 14:58 file1
ayush@ayush:~$ touch file2
ayush@ayush:~$ ls -l file2
-rw-r--r-- 1 ayush ayush 0 Feb 13 14:59 file2
ayush@ayush:~$ chmod g+s file2
ayush@ayush:~$ ls -l file2
-rw-r-Sr-- 1 ayush ayush 0 Feb 13 14:59 file2
ayush@ayush:~$
```

12. What is the use of Sticky bit?
    => A Sticky bit is a permission bit that is set on a file or a directory that lets only the owner of the file/directory or the root user delete or rename the file.

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

```
ayush@ayush:~$ sudo useradd -G ayush -m test
ayush@ayush:~$ id test
uid=1001(test) gid=1001(test) groups=1001(test),1000(ayush)
ayush@ayush:~$
```

14. Lock this user.

```
ayush@ayush:~$ sudo useradd -G ayush -m test
ayush@ayush:~$ id test
uid=1001(test) gid=1001(test) groups=1001(test),1000(ayush)
ayush@ayush:~$ sudo passwd test
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
ayush@ayush:~$ sudo passwd -l test
passwd: password expiry information changed.
ayush@ayush:~$ su test
Password:
su: Authentication failure
ayush@ayush:~$
```

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

```
# User privilege specification
root    ALL=(ALL:ALL) ALL
test    ALL=(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
```

```
ayush@ayush:~$ sudo passwd -u test
passwd: password expiry information changed.
ayush@ayush:~$ su test
Password:
$ sudo apt install vim
Reading package lists... Done
Building dependency tree
Reading state information... Done
vim is already the newest version (2:8.0.1453-1ubuntu1.1).
0 upgraded, 0 newly installed, 0 to remove and 2 not upgraded.
$
```

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

```
ayush@ayush:~$ ls /home/test/
examples.desktop
ayush@ayush:~$ mkdir backup
ayush@ayush:~$ ls backup/
ayush@ayush:~$ sudo deluser --remove-home --backup-to backup/ test
Looking for files to backup/remove ...
Backing up files to be removed to backup/ ...
backup_name = backup//test.tar
/bin/tar: Removing leading `/' from member names
Removing files ...
Removing user `test' ...
Warning: group `test' has no more members.
Done.
ayush@ayush:~$ ls backup/
test.tar.bz2
ayush@ayush:~$
```

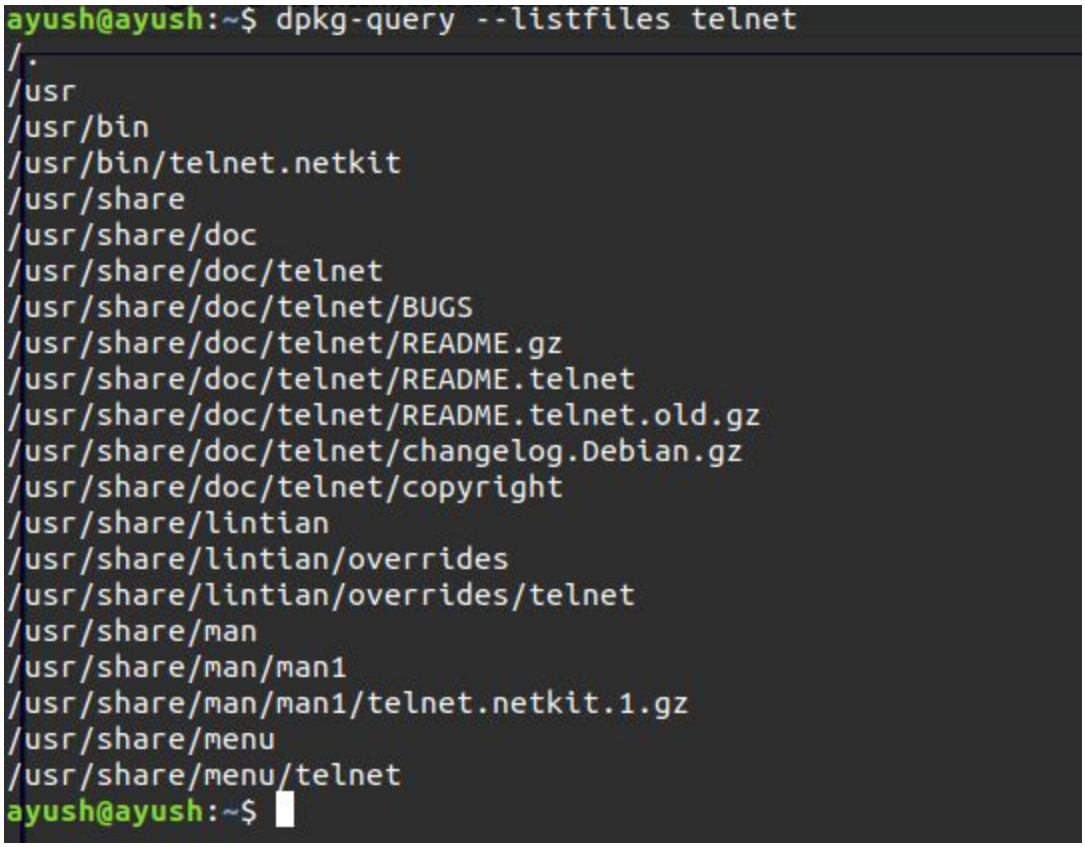
17. Create a file with some content. Change all lower case letters to upper case letters and save output to another file using redirections.

```
ayush@ayush:~$ cat > input
this is a test file
ayush@ayush:~$ tr '[:lower:]' '[:upper:]' < input > output
ayush@ayush:~$ cat output
THIS IS A TEST FILE
ayush@ayush:~$
```

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

```
ayush@ayush:~$ ps -eo "%p %n %c %U" | sort -nr | head
20226   0 head            ayush
20225   0 sort            ayush
20224   0 ps              ayush
20220   0 nm-dispatcher   root
19983   0 dhclient        root
19867   - irq/16-mmc0     root
19866   - irq/128-mei_me  root
19865   0 kworker/u16:49  root
19864   0 kworker/u16:48  root
19863   0 kworker/u16:47  root
ayush@ayush:~$ sudo renice -1 19865
19865 (process ID) old priority 0, new priority -1
ayush@ayush:~$ ps -eo "%p %n %c %U" | sort -nr | head
20232   0 head            ayush
20231   0 sort            ayush
20230   0 ps              ayush
19983   0 dhclient        root
19867   - irq/16-mmc0     root
19866   - irq/128-mei_me  root
19865  -1 kworker/u16:49  root
19864   0 kworker/u16:48  root
19863   0 kworker/u16:47  root
19862   0 kworker/u16:46  root
```

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



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

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

Protocol mismatch.
Connection closed by foreign host.
ayush@ayush:~$ netstat -nltp
(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 0.0.0.0:7070            0.0.0.0:*               LISTEN      -
tcp        0      0 0.0.0.0:39943           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      0 127.0.0.1:9614          :::*                    LISTEN      2000/java
tcp6       0      0 :::80                   :::*                    LISTEN      -
ayush@ayush:~$
```

21. Create a cron job which runs once a week at 23:45.
    => $crontab -e
        45 23 * * 1

22. Difference between dig and traceroute
    => Traceroute gives hop count.

```
ayush@ayush:~$ traceroute6 google.com
traceroute to google.com (2404:6800:4002:804::200e) from 2409:4050:e81:250f:3589:2f99:ca2f:
a5d0, 30 hops max, 24 byte packets
 1  * * *
 2  * * *
 3  2405:200:330:eeee:20::16 (2405:200:330:eeee:20::16)  83.468 ms  42.805 ms  39.127 ms
 4  2405:200:801:300::e0f (2405:200:801:300::e0f)  28.63 ms  62.858 ms  54.035 ms
 5  2405:200:804:1824:80::105 (2405:200:804:1824:80::105)  72.969 ms  38.866 ms  43.43 ms
 6  2405:200:804:1824:80::105 (2405:200:804:1824:80::105)  47.306 ms  45.015 ms  44.962 ms
 7  * * *
 8  2405:200:801:300::e0a (2405:200:801:300::e0a)  34.35 ms  40.448 ms  38.382 ms
 9  2405:200:801:300::df5 (2405:200:801:300::df5)  39.782 ms  26.775 ms  40.672 ms
10  2405:200:1602:1739::3 (2405:200:1602:1739::3)  31.51 ms  28.068 ms  38.079 ms
11  2001:4860:1:1::c6 (2001:4860:1:1::c6)  31.412 ms  48.894 ms  40.12 ms
12  2001:4860:0:11dd::1 (2001:4860:0:11dd::1)  41.294 ms  39.432 ms  32.74 ms
13  * 2001:4860:0:1::37 (2001:4860:0:1::37)  103.143 ms *
14  del03s09-in-x0e.1e100.net (2404:6800:4002:804::200e)  55.558 ms  52.329 ms  39.562 ms
ayush@ayush:~$
```

    => Dig shows ip address corresponding to domain name.

```
ayush@ayush:~$ dig google.com

; <<>> DiG 9.11.3-1ubuntu1.11-Ubuntu <<>> google.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 6615
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

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

;; ANSWER SECTION:
google.com.             255     IN      A       172.217.160.238

;; Query time: 1707 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Thu Feb 13 17:49:15 IST 2020
;; MSG SIZE  rcvd: 55

ayush@ayush:~$
```