1. **Describe how you would make the 'grep' command highlight matched patterns in colour.**

   grep —color=’auto’ pattern filename

   How could you change the default behaviour of the 'grep' command so that it always uses colour?

   Using alias
   alias grep=”grep --color=’auto’”

   How would you ensure that this is the behaviour of 'grep' every time that you log in?

   Access .bashrc run the below:
   gedit ~/.bashrc

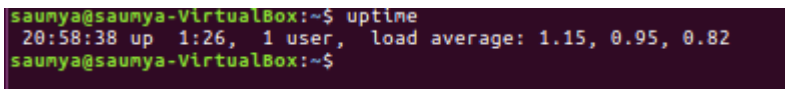
   Put alias in *.bash_profile* or *.bashrc* :
   alias grep=”grep --color=’auto’”

2. **What is the system load average?**

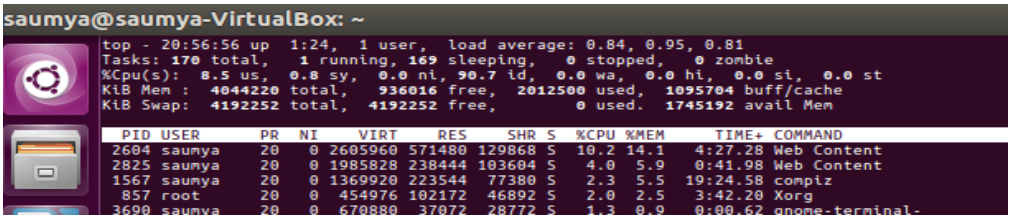
   Load average is the weighted moving average of the computational load. There are 3 numbers displayed which are system loads during last 1 min, 5 minutes and 15 minutes respectively.

   Give at least two commands which display the load average.

   uptime, and



   top commands



Describe briefly a rule of thumb for the load average -- e.g. what load average on chuck might give rise to concern.

Temporary or occasional spikes(>0.70) are Ok to work with, but if it becomes frequent or consistent then is should be a concern

Load averages	Rule of thumb
>0.00	Under-utilization of CPU
>0.70	Need to Look into it
>1.00	Fix this now
>5.00	Arrgh, it's 3AM WTF?

3. **What is the default kill signal?**

TERM (the termination signal-requests that the process exit

What is a zombie process?

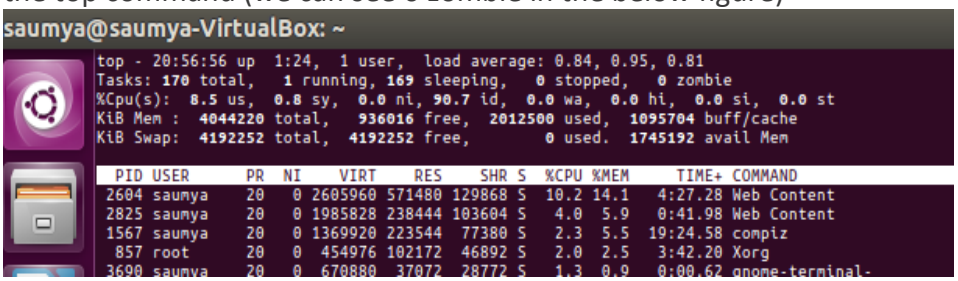
The process that is terminated but not reaped by its parent.

This happens:

1. When the parent tends to use the child process again, so it doesn't terminate, and uses the same child process instead of creating it again
2. When the parent missing terminating the child process mistakenly or due to its inability

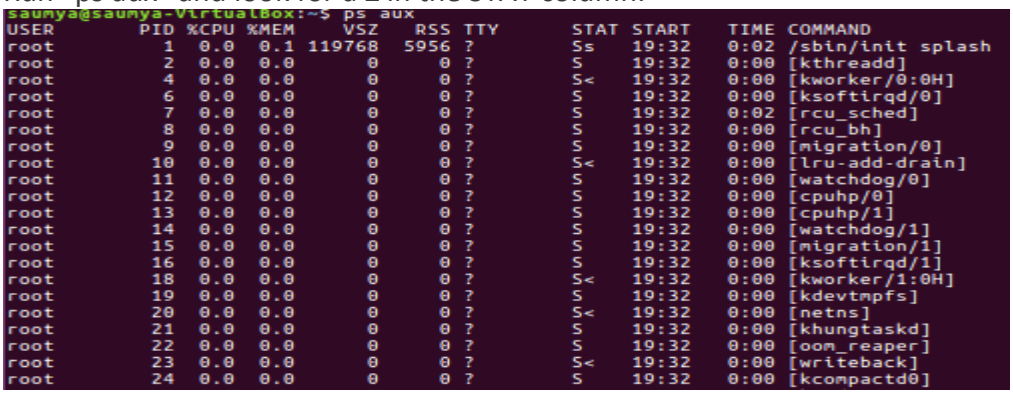
How would you get a list of zombie processes?

the top command (we can see 0 zombie in the below figure)



OR the ps command display zombie processes, as shown in the below figure

Run "ps aux" and look for a Z in the STAT column.



4. **What is a runlevel?**

Runlevel is an Init(system V) state in the Unix-based operating system that tells which mode to operate in. Every runlevel is responsible for the different kinds of processes/services to be started by the system.

System V runlevels

ID	Description
0	Shut down system, power-off if hardware supports it (only available from the console)
1	Single-user mode, all filesystems unmounted but not root, all processes except console processes killed
2	Multi-user mode
3	Multi-user mode with RFS and NFS filesystems exported
4	Multi-user, User-definable
5	Halt the operating system, go to firmware
6	server is issued a reboot command
s, **S**	Identical to **1**, except current terminal acts as the system console

What are the two main runlevels used on a Linux system?

Run level 3 for a text console login as most Linux servers lack a GUI, and Run level 5 for a graphical login for servers with GUI and desktop Unix systems.

5. **What is a setuid program?**

The setuid (set user id) program changes its effective user ID.

What command-line could you use to find all of the setuid programs in /usr?

find /usr -type f -perm /4000

6. **Using standard command-line utilities, show how to do the following:**
    1. **Relative to the current directory, display a list of file/folder sizes in order of size (for folders, the size must include the contents of the folder)**
    du -sh ./*/* ./* | sort -h

    2. **Count the number of running 'bash' processes (careful to only include 'bash' processes, and not for example someone running 'gedit bashful.txt'**
    ps -C bash --no-headers | wc -l

    3. **Count the number of running processes (careful not to include the header line)**
    ps -C --no-headers | wc -l

4. **Given an input text file, only display lines from that file which contain a group of 16 digits, with optional dashes after each group of 4. Whitespace at the start and end of the line is allowed, but nothing else.**
   grep "(^|[ ])[0-9]{4}[-]\?[0-9]{4}[-]\?[0-9]{4}[-]\?[0-9]{4}($|[ ])" file

5. **Find all files in a given directory which are bigger than 100MB in size and haven't been modified in over 30 days, and compress them with gzip.**
   find \path ! -name '*.gz' \ -type f \ -size +"$((100*1024*1024))c" \ -mtime +30 \ -exec gzip {} +

6. **Ignoring files that you don't have permission to read (and make sure that any errors are not displayed), count how many files in the '/etc' directory contain the word "linux" (in any mixture of upper- or lower-case). You can just take the files immediately in /etc and not subdirectories.**
   find /etc -name linux* | wc -l

7. **Given a standard '/etc/passwd' file, display a sorted list of Full Names - only the GCOS field, and not other columns from the file.**
   find /etc/passwd '!' -name 'GCOS'