

ASSIGNMENT 3

LINUX

Ques 1. Install VirtualBox (Vagrant) on your laptop, spin up centos 7, and Ubuntu 18.04 Machine.

centos /7 and ubuntu/bionic64 are the Vagrant boxes that you need to download.

Solution:

Commands to install VirtualBox:

Sudo apt update

Sudo apt install virtualbox

Sudo apt install vagrant

Mkdir ~/vagrant

Cd ~/vagrant

Vagrant init centos/7 (vagrant init ubuntu/bionic64)

Vagrant up

Vagrant ssh

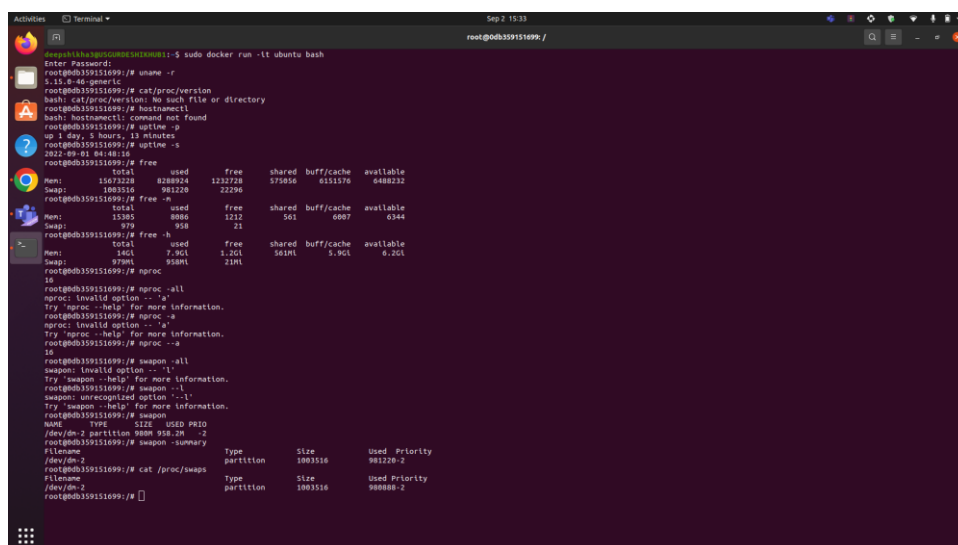
Vagrant halt

Vargant destroy

Ques 2. Find OS version, kernel version, uptime, memory, cores, and swap details of Linux machine.

- Be ready to explain what is free & available memory.
- Release all cache memory & how do you manage the same in a prod env.
- Increase the ulimit for the current user to 1028.
- Change the timezone to IST

Solution:



```
root@db359151699:~# uname -r
5.15.0-46-generic
root@db359151699:~# cat /proc/version
bash: cat/proc/version: No such file or directory
root@db359151699:~# hostnmecl
bash: hostnmecl: command not found
root@db359151699:~# uptime
up 1 day, 5 hours, 13 minutes
root@db359151699:~# uptime -s
2022-09-01 04:48:16
root@db359151699:~# free
             total        used        free      shared  buff/cache   available
Mem:        15673228    8288924    1232728      17056     611176     6488232
Swap:        1803216     91220         22296
root@db359151699:~# free -m
             total        used        free      shared  buff/cache   available
Mem:          15392         8086         1212         561         6407         6344
Swap:           876           958           21
root@db359151699:~# free -h
             total        used        free      shared  buff/cache   available
Mem:           14Gi          7.9Gi          1.2Gi       32Mi          5.9Gi          6.1Gi
Swap:           979Mi          918Mi          21Mi
root@db359151699:~# nproc
16
root@db359151699:~# nproc --all
nproc: invalid option -- 'a'
Try 'nproc --help' for more information.
root@db359151699:~# nproc -a
nproc: invalid option -- 'a'
Try 'nproc --help' for more information.
root@db359151699:~# nproc --a
16
root@db359151699:~# swap --all
swap: invalid option -- 'l'
Try 'swap --help' for more information.
root@db359151699:~# swap --l
swap: unrecognized option -- 'l'
Try 'swap --help' for more information.
root@db359151699:~# swap --summary
NAME      TYPE      SIZE      USED      PRI0
/dev/dm-2 partition 988M 958.3M    -2
root@db359151699:~# swap --summary
Filesystem      Type      Size      Used      Priority
/dev/dm-2        partition 1003516      988356      98228-2
root@db359151699:~# cat /proc/swaps
Filesystem      Type      Size      Used      Priority
/dev/dm-2        partition 1003516      988356      98888-2
root@db359151699:~#
```

The `uname` command displays several system information including, the Linux kernel architecture, name version, and release.

The `nproc` command shows the number of processing units available on your Linux machine, run

a) Free memory is the amount of memory that is currently not used for anything. For this reason, especially on servers, I like to consider free memory as wasted memory. Once your applications/processes have launched and considerable uptime has passed, this number should almost always be small.

Available memory is the amount of memory that is available for allocation to new or existing processes. Available memory is then an estimation of how much memory is available for use without swapping.

The **difference between free memory vs. available memory in Linux** is, that free memory is not in use and sits there doing nothing. While available memory is used memory that includes but is not limited to caches and buffers, that can be freed without the performance penalty of using swap space.

b) `swapoff -a && swapon -a`

c) `ulimit -c unlimited`

`ulimit -c`
`unlimited`

d) `timedatectl` is a command-line utility that allows you to view and change the system's time and date.

1. First search for the available time zone by the below command.

`timedatectl list-timezones | grep -i Asia`

2. Then unlink the current timezone

`sudo unlink /etc/localtime`

3. Now set the new timezone. The syntax for setting the new time zone is as below

`sudo ln -s /usr/share/zoneinfo/[zone/timezone] /etc/localtime`

For example

`sudo ln -s /usr/share/zoneinfo/Asia/Kolkata /etc/localtime`

4. Now check the Date/Time using `date` command.

`date`

Commands:

`uname -srm`

`cat /proc/version`

`cat /etc/os-release` command to find os name and version in Linux:

`lsb_release -a`

`hostnamectl`

command to find Linux kernel version:

`uname -r`

`uptime -p`

`uptime -s`

`Free`

`free -m`

`free -h`

`Nproc`

`nproc -all`

`swapon -all`

`swapon --summary`

`cat /proc/swaps`

Ques 3. Install nginx

a. Configure the web server. Change the default location

b.Route all the requests to port 8080.

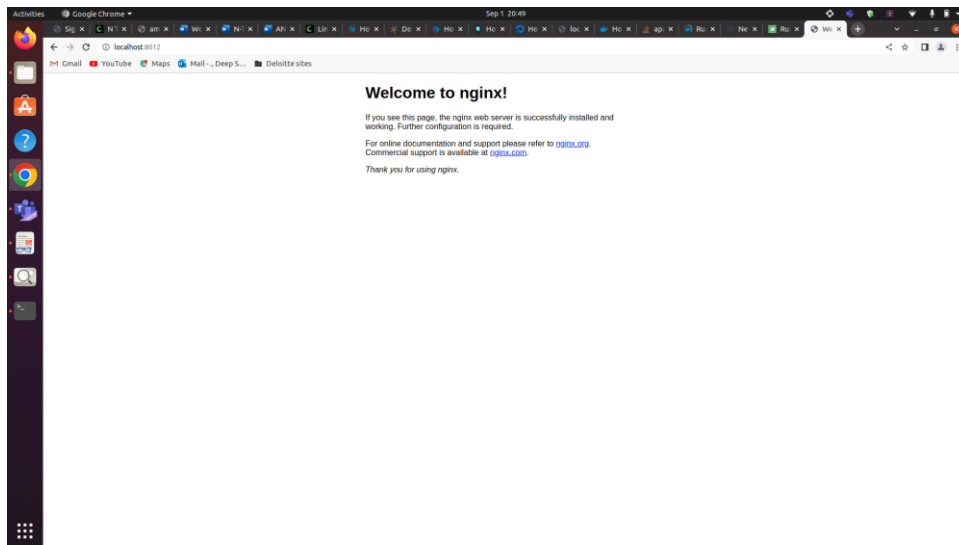
c. Configure the web server which shows files/directories and make them downloadable from the web page.

Solution:

`sudo apt update`

`sudo apt install nginx`

`systemctl status nginx`



Steps:

- DocumentRoot /home/trendoceans/Documents/sitedata
<Directory "/home/trendoceans/Documents/sitedata">
Require all granted
</Directory>
- sudo vi /etc/apache2/sites-available/000-default.conf

Ques 4. Create a job in crontab to create zip of system logs every last day of the month and keep only the last 30 days' logs.

Solution:

```

root@f0d984e0c0: /
--help | -h      usage message
--version | -v   version number and copyright
--conf | -c FILE use FILE as configuration file

root@f0d984e0c0: /# deluser --remove DEEPMITHA sudo
Option remove is ambiguous (remove-all-files, remove-home)
deluser USER
  remove a normal user from the system
  example: deluser niki

--remove-home    remove the users home directory and mail spool
--remove-all-files remove all files owned by user
--backup         backup files before removing
--backup-to <DIR> target directory for the backups.
                  default is the current directory.
--system         only remove if system user

delgroup GROUP
deluser --group GROUP
  remove a group from the system
  example: deluser --group students

--system         only remove if system group
--only-if-empty  only remove if no members left

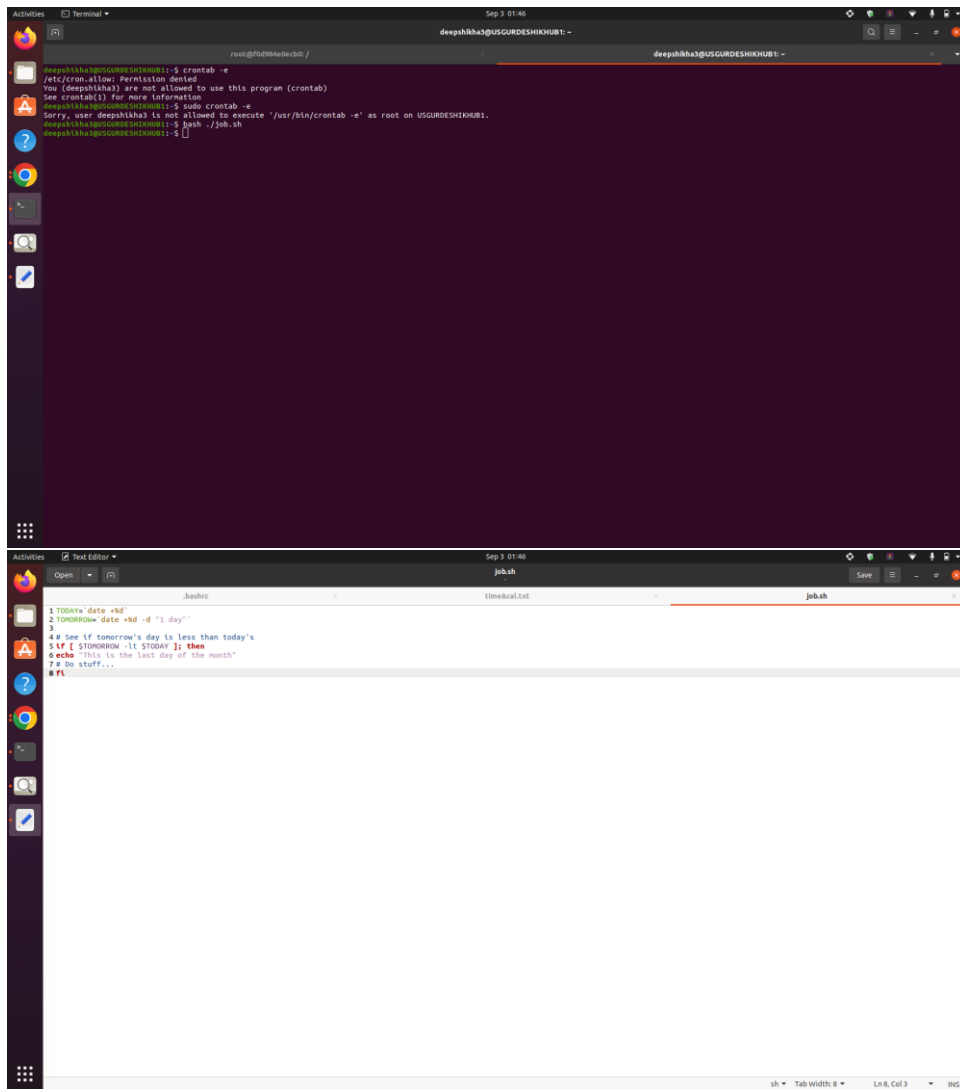
deluser USER GROUP
  remove the user from a group
  example: deluser niki students

general options:
--quiet | -q      don't give process information to stdout
--help | -h      usage message
--version | -v   version number and copyright
--conf | -c FILE use FILE as configuration file

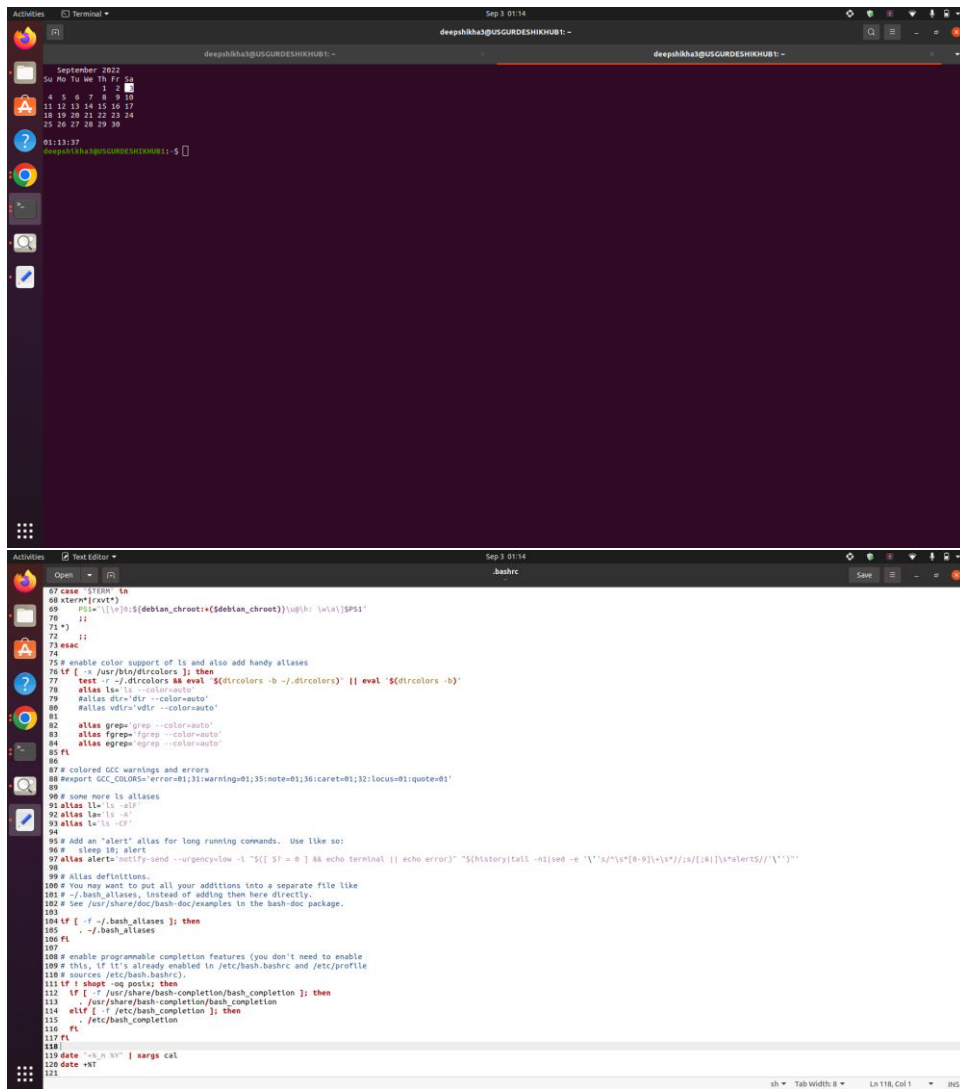
root@f0d984e0c0: /# deluser --remove-home sudo
/usr/sbin/deluser: In order to use the --remove-home, --remove-all-files, and --backup features,
you need to install the 'perl' package. To accomplish that, run
apt-get install perl.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Package perl is not available, but it is referred to by another package.
This may mean that the package is missing, has been obsoleted, or
is only available from another source
However, the following packages replace it:
perl-base

E: Package 'perl' has no installation candidate
root@f0d984e0c0: /# touch /var/www/html/my.zip.file.zip
touch: cannot touch '/var/www/html/my.zip.file.zip': No such file or directory
root@f0d984e0c0: /# gedit /var/www/html/my.zip.file.zip
bash: gedit: command not found
root@f0d984e0c0: /#

```



Ques 5. Date and Calendar should print whenever I open the terminal
Solution:



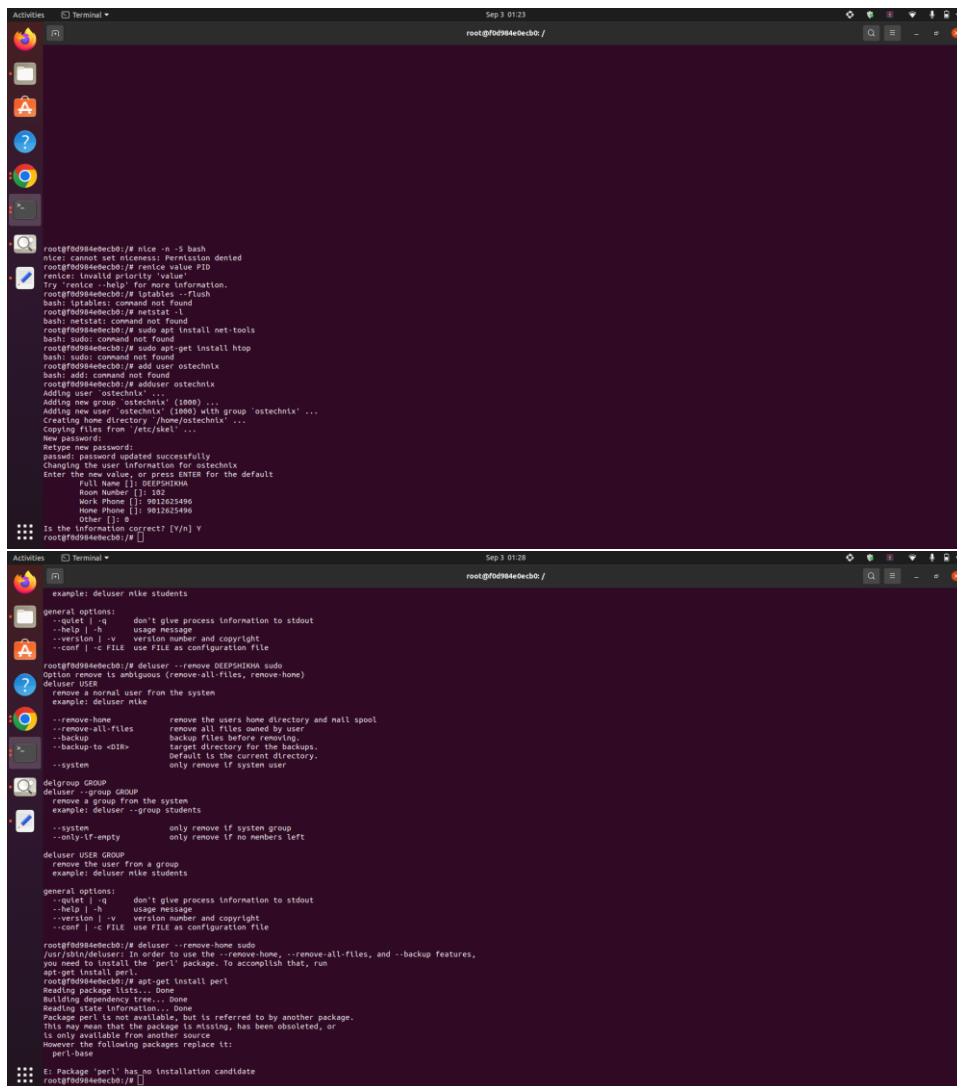
Command used:

date "+%_m %Y" | xargs cal
date +%T

Steps:

1. Edit the ~barch file add the commands given above.
2. Save the file and open terminal.
3. The output is shown in screenshots.

Ques 6. Create a User, and give it sudo privileges. But remove the power of rm.
Solution:



The image shows two terminal windows. The top window shows the process of creating a user named 'ostechnix' with sudo privileges. The bottom window shows the usage of the 'deluser' command with various options.

```
root@f0d984e6cb:/# nice -n -5 bash
nice: cannot set niceness: Permission denied
root@f0d984e6cb:/# renice value PID
renice: invalid priority 'value'
Try 'renice -help' for more information.
root@f0d984e6cb:/# iptables --flush
bash: iptables: command not found
root@f0d984e6cb:/# netstat -l
bash: netstat: command not found
root@f0d984e6cb:/# sudo apt install net-tools
bash: sudo: command not found
root@f0d984e6cb:/# sudo apt-get install htop
bash: sudo: command not found
root@f0d984e6cb:/# adduser ostechnix
bash: add: command not found
root@f0d984e6cb:/# adduser ostechnix
Adding user 'ostechnix' ...
Adding new group 'ostechnix' (1000) ...
Adding new user 'ostechnix' (1000) with group 'ostechnix' ...
Creating home directory '/home/ostechnix' ...
Copying files from '/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for ostechnix
Enter the new value, or press ENTER for the default
  Full Name []: DEEPSHIKHA
    Room Number []: 102
      Work Phone []: 9012625490
      Home Phone []: 9012625490
    Other []: #
Is the information correct? [Y/n] Y
root@f0d984e6cb:/#
```

```
example: deluser ntk students

general options:
--quiet | -q          don't give process information to stdout
--help | -h           usage message
--version | -v        version number and copyright
--conf | -c FILE     use FILE as configuration file

root@f0d984e6cb:/# deluser --remove DEEPSHIKHA sudo
Option remove is ambiguous (remove-all-files, remove-home)
deluser USER
remove a normal user from the system
example: deluser ntk

--remove-home         remove the users home directory and mail spool
--remove-all-files   remove all files owned by user
--backup              backup files before removing,
                     target directory for the backups.
                     Default is the current directory.
                     only remove if system user
--system

delgroup GROUP
deluser --group GROUP
remove a group from the system
example: deluser --group students

--system             only remove if system group
--only-if-empty       only remove if no members left

deluser USER GROUP
remove the user from a group
example: deluser ntk students

general options:
--quiet | -q          don't give process information to stdout
--help | -h           usage message
--version | -v        version number and copyright
--conf | -c FILE     use FILE as configuration file

root@f0d984e6cb:/# deluser --remove-home sudo
/usr/sbin/deluser: In order to use the --remove-home, --remove-all-files, and --backup features,
you need to install the 'perl' package. To accomplish that, run
apt-get install perl.
root@f0d984e6cb:/# apt-get install perl
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Package perl is not available, but is referred to by another package.
This may mean that the package is missing, has been obsoleted, or
is only available from another source
However, the following packages replace it:
perl-base

E: Package 'perl' has no installation candidate
root@f0d984e6cb:/#
```

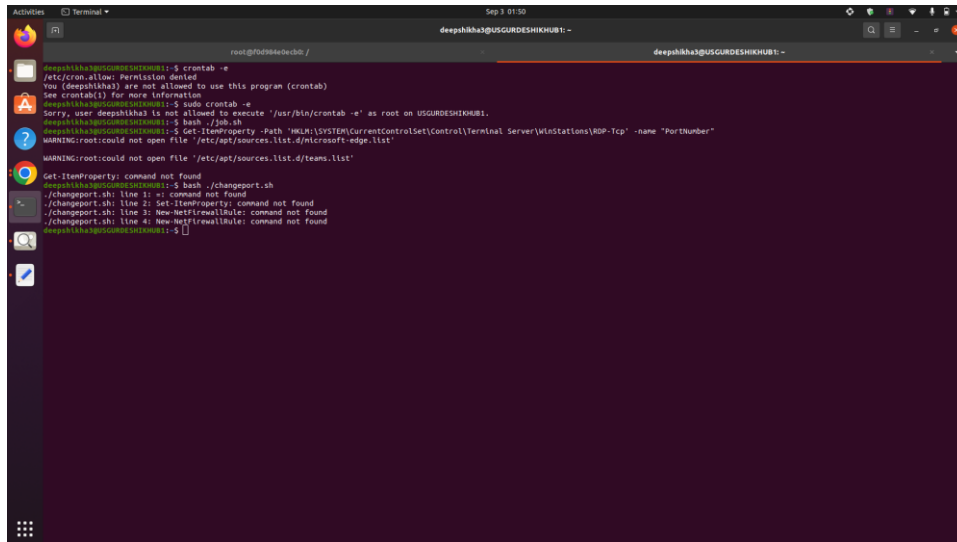
Commands:

sudo adduser ostechnix

sudo deluser --remove-home username

Ques 7. Change the default port number for RDP to 8339 and document on the same.

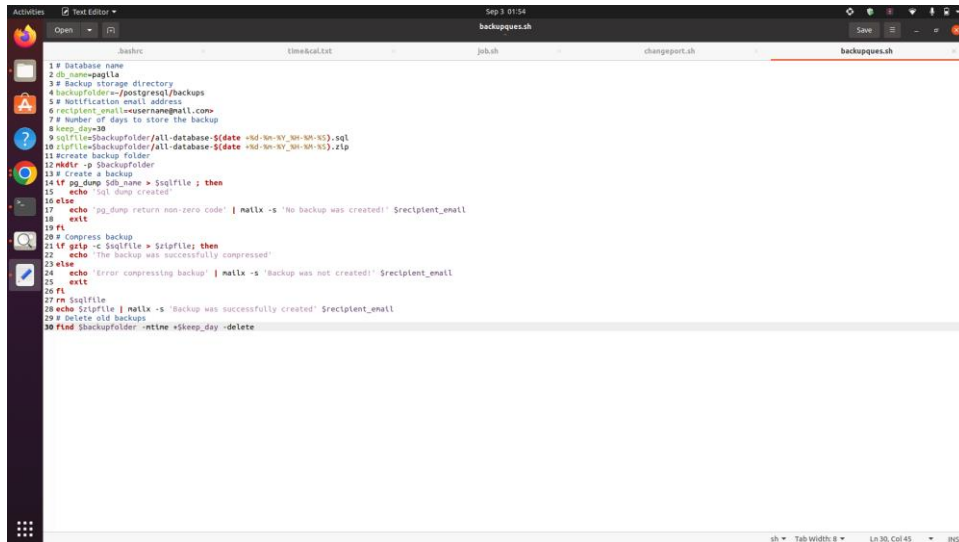
Solution:



```
root@f0d984e0c3b: /  
deepshikha@USGURDESHIKHUB1: -  
deepshikha@USGURDESHIKHUB1:~$ crontab -e  
/etc/cron.allow: Permission denied  
You (deepshikha) are not allowed to use this program (crontab)  
See crontab(5) for more information.  
deepshikha@USGURDESHIKHUB1:~$ sudo crontab -e  
Sorry, user 'deepshikha' is not allowed to execute '/usr/bin/crontab -e' as root on USGURDESHIKHUB1.  
deepshikha@USGURDESHIKHUB1:~$ bash ./job.sh  
deepshikha@USGURDESHIKHUB1:~$ Get-ItemProperty -Path 'HKLM:\SYSTEM\CurrentControlSet\Control\Terminal Server\WinStations\RDP-Tcp' -Name "PortNumber"  
WARNING:root:could not open file "/etc/apt/sources.list.d/microsoft-edge.list"  
Get-ItemProperty: command not found  
deepshikha@USGURDESHIKHUB1:~$ bash ./changeport.sh  
./changeport.sh: line 1: =: command not found  
./changeport.sh: line 2: Set-ItemProperty: command not found  
./changeport.sh: line 3: New-NetFirewallRule: command not found  
./changeport.sh: line 4: New-NetFirewallRule: command not found  
deepshikha@USGURDESHIKHUB1:~$
```

Ques 8. Create a script to take regular backup of the database(MySql & Postgres), say every day at 11PM.

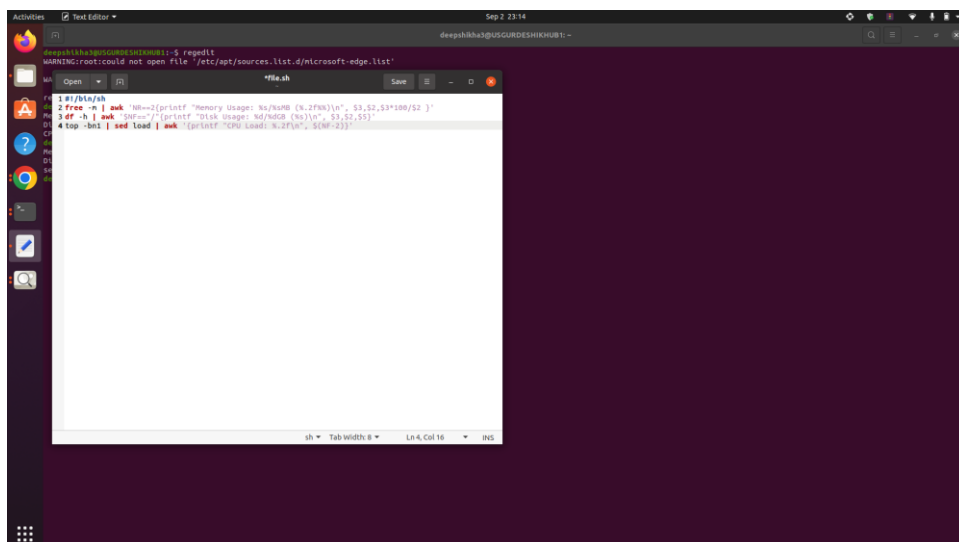
Solution:



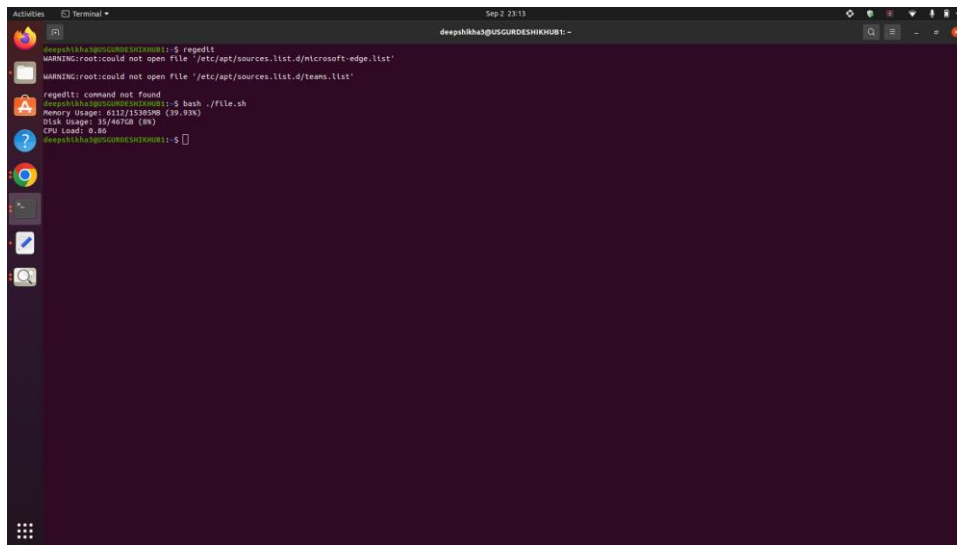
```
1 # Database name
2 db_name=paglla
3 # Backup storage directory
4 backupfolder=/postgreSQL/backups
5 # Notification email address
6 recipient_email=seesname@gmail.com
7 # Number of days to store the backup
8 keep_days=30
9 sqlfile=backupfolder/all-database-$(date +%d-%m-%Y_%H-%M-%S).sql
10 if [ ! -d $backupfolder ]; then
11 mkdir -p $backupfolder
12 fi
13 # Create a backup
14 if pg_dump $db_name > $sqlfile; then
15 echo "sql dump created"
16 else
17 echo "pg_dump return non-zero code" | mailx -s "No backup was created!" $recipient_email
18 exit
19 fi
20 # Compress backup
21 if gzip -c $sqlfile > $zipfile; then
22 echo "The backup was successfully compressed"
23 else
24 echo "Error compressing backup" | mailx -s "Backup was not created!" $recipient_email
25 exit
26 fi
27 rm $sqlfile
28 echo $zipfile | mailx -s "Backup was successfully created" $recipient_email
29 # Delete old backups
30 find $backupfolder -mtime +$keep_days -delete
```

Ques 9. Create a file that contains memory usage and the number of cpu in linux using the sed command.

Solution:



```
1 #!/bin/sh
2 free -m | awk 'NR==2{printf "Memory Usage: %s/%sMB (%.2f%%)\n", $3,$2,$3*100/$2 }'
3 df -h | awk 'NR==2{printf "Disk Usage: %d/%dGB (%s)\n", $3,$2,$5}'
4 top -bn1 | and load | awk '{printf "CPU Load: %.2f\n", $0}'
```

A screenshot of a Linux terminal window. The window title is "Terminal" and the user is "deepshikha@USGURDESHIKHUB1". The terminal shows the following output:

```
deepshikha@USGURDESHIKHUB1:~$ regedit
WARNING:root:could not open file '/etc/apt/sources.list.d/microsoft-edge.list'
WARNING:root:could not open file '/etc/apt/sources.list.d/teams.list'

regedit: command not found
deepshikha@USGURDESHIKHUB1:~$ bash ./file.sh
Memory Usage: 6112/15380MB (39.83%)
Disk Usage: 30/407GB (8%)
CPU Load: 0.86
deepshikha@USGURDESHIKHUB1:~$
```

Steps:

1. I created a script with code to find memory usage and cpu in linux.
2. Saved the file with .sh extension.
3. Open the terminal and run the file.
4. The output is attached in the screenshot.

Command:

bash ./file.sh

Ques 10. Find a file with all command line history and Delete the Complete Command line History.

Solution:

```
Activities Terminal Sep 2 23:01
root@f0d984e6cb:/

deepshikha@GURUSHIXMIB1:~$ sudo docker ubuntu
Enter Password:
docker: 'ubuntu' is not a docker command.
See 'docker --help'

deepshikha@GURUSHIXMIB1:~$ sudo docker run -it ubuntu
root@f0d984e6cb:/# (free |grep mem |awk (print $3/$2 * 100. ))
bash: syntax error near unexpected token `print'
root@f0d984e6cb:/# top -b -n 2 -d1 | sed "cpu(s)"
sed: e expression #1, char 1: unknown command: `C'
root@f0d984e6cb:/# which history
root@f0d984e6cb:/# which history which: no history in (/usr/local/bin:/usr/bin:/bin:/usr/games:/usr/local/sbin)
bash: syntax error near unexpected token `{ '
root@f0d984e6cb:/# which history which: no history in (/usr/local/bin:/usr/bin:/bin:/usr/games:/usr/local/sbin)
bash: syntax error near unexpected token `{ '
root@f0d984e6cb:/# history
1 (free |grep mem |awk (print $3/$2 * 100. ))
2 top -b -n 2 -d1 | sed "cpu(s)"
3 which history
4 which history which: no history in (/usr/local/bin:/usr/bin:/bin:/usr/games:/usr/local/sbin)
5 which history which: no history in (/usr/local/bin:/usr/bin:/bin:/usr/games:/usr/local/sbin)
6 history
root@f0d984e6cb:/# history -c
root@f0d984e6cb:/# history
1 history
root@f0d984e6cb:/#
```

Steps:

1. Checked the history of command line.
2. Delete the history of command line.

Commands used:

History

History -c

Ques 11. Detecting which process has the highest priority in the system. Now find out what its purpose is.

Solution:

```
Activities Terminal Sep 2 23:22
root@f0d984e6cb:/

deepshikha@GURUSHIXMIB1:~$ sudo docker ubuntu
Enter Password:
docker: 'ubuntu' is not a docker command.
See 'docker --help'

deepshikha@GURUSHIXMIB1:~$ sudo docker run -it ubuntu
root@f0d984e6cb:/# (free |grep mem |awk (print $3/$2 * 100. ))
bash: syntax error near unexpected token `print'
root@f0d984e6cb:/# top -b -n 2 -d1 | sed "cpu(s)"
sed: e expression #1, char 1: unknown command: `C'
root@f0d984e6cb:/# which history
root@f0d984e6cb:/# which history which: no history in (/usr/local/bin:/usr/bin:/bin:/usr/games:/usr/local/sbin)
bash: syntax error near unexpected token `{ '
root@f0d984e6cb:/# which history which: no history in (/usr/local/bin:/usr/bin:/bin:/usr/games:/usr/local/sbin)
bash: syntax error near unexpected token `{ '
root@f0d984e6cb:/# history
1 (free |grep mem |awk (print $3/$2 * 100. ))
2 top -b -n 2 -d1 | sed "cpu(s)"
3 which history
4 which history which: no history in (/usr/local/bin:/usr/bin:/bin:/usr/games:/usr/local/sbin)
5 which history which: no history in (/usr/local/bin:/usr/bin:/bin:/usr/games:/usr/local/sbin)
6 history
root@f0d984e6cb:/# history -c
root@f0d984e6cb:/# history
1 history
root@f0d984e6cb:/# regedit
bash: regedit: command not found
root@f0d984e6cb:/# sudo crontab -e
bash: sudo: command not found
root@f0d984e6cb:/# crontab -e
bash: crontab: command not found
root@f0d984e6cb:/# top
top - 17:52:12 up 4:45, 0 users, load average: 0.01, 0.74, 0.77
task: 0 blocked, 3 running, 1 sleeping, 0 stopped, 0 zombie
ncpu(s): 0.0 us, 0.9 sy, 0.0 nt, 94.0 id, 0.1 wa, 0.0 hi, 0.1 si, 0.0 st
MiB Mem : 15365.9 total, 5229.5 free, 6542.0 used, 3934.4 buff/cache
MiB Swap: 800.0 total, 746.0 free, 0.0 used, 8155.0 avail Mem

  PID USER      PS  W%  VIRT  RES  SHR S  CPU   MEM%
  1 root        20  0    4224 3080 3116 S  0.0  0.0  0:00.10 bash
 15 root        20  0    7316 3232 2656 R  0.0  0.0  0:00.00 top
```

The running instance of program is process, and each process needs space in RAM and CPU time to be executed, each process has its priority in which it is executed. The column NI represents nice value of a process.

Nice value only controls CPU time assigned to process and not utilisation of memory and I/O devices.

nice and renice command

nice command is used to start a process with specified nice value, which renice command is used to alter priority of running process.

Purpose of nice command :

Lets assume the case that system has only 1GB of RAM and it's working really slow, processes are not responding quickly, in that case if you want to kill some of the processes, you need to start a terminal, if you start your bash shell normally, it will also produce lag but you can avoid this by starting the bash shell with high priority.

To alter priority of running process, we use renice command.

Commands:

top

```
nice -n -5 bash
```

Comment:

After running top command in container I put the screenshot but Niece command didn't run on our laptop.

Ques 12. Perform the below tasks on the firewall using iptables:

- Block outgoing connections on port 80
- Allow incoming connections on port 3306
- Allow both incoming and connections on port 80, 443 and 22
- Block Facebook on Iptable firewall

Solution:

Steps:

```
Activities Terminal Sep 3 01:59
root@f0d964e0c3b: /

deluser --group GROUP
remove a group from the system
example: deluser --group students
--system only remove if system group
--only-if-empty only remove if no members left

deluser USER GROUP
remove the user from a group
example: deluser nuke students

general options:
--quiet | -q don't give process information to stdout
--help | -h usage message
--version | -v version number and copyright
--conf | -c FILE use FILE as configuration file

root@f0d964e0c3b:/# deluser --remove-home sudo
/usr/sbin/deluser: in order to use the --remove-home, --remove-all-files, and --backup features,
you need to install the 'perl' package. To accomplish that, run
apt-get install perl
root@f0d964e0c3b:/# apt-get install perl
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Package perl is not available, but is referred to by another package.
This may mean that the package is missing, has been obsoleted, or
is only available from another source.
However the following packages replace it:
perl-base

E: Package 'perl' has no installation candidate
root@f0d964e0c3b:/# touch /var/www/html/my-zip-file.zip
touch: cannot touch '/var/www/html/my-zip-file.zip': No such file or directory
root@f0d964e0c3b:/# gedit /var/www/html/my-zip-file.zip
bash: gedit: command not found
root@f0d964e0c3b:/# rm /var/www/html/my-zip-file*.zip &&
zip /var/www/html/my-zip-file-1234567890.zip /home/myuser/myworkingdir/file.txt
rm: cannot remove '/var/www/html/my-zip-file*.zip': No such file or directory
root@f0d964e0c3b:/# crontab -e
bash: crontab: command not found
root@f0d964e0c3b:/# Get-ItemProperty -Path 'HKLM:\SYSTEM\CurrentControlSet\Control\Terminal Server\WinStations\RDP-Tcp' -Name 'PortNumber'
bash: Get-ItemProperty: command not found
root@f0d964e0c3b:/# apt install firewall
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Unable to locate package firewall
root@f0d964e0c3b:/# apt install firewall status
firewall: unrecognized service
root@f0d964e0c3b:/# firewall-cmd --remove-port=22/tcp --permanent
bash: firewall-cmd: command not found
root@f0d964e0c3b:/#
```

Commands:

apt install firewall

firewall-cmd --remove-port=80/tcp --permanent

Sudo ufw allow 80

Sudo ufw allow 443

Sudo ufw allow 22

-A FORWARD -p tcp -m tcp --sport 443 -m string --string "facebook" --algo bm -j DROP

-A FORWARD -p tcp -m tcp --sport 80 -m string --string "facebook" --algo bm -j DROP

-A FORWARD -p tcp -m tcp --dport 443 -m string --string "facebook" --algo bm -j DROP

-A FORWARD -p tcp -m tcp --dport 80 -m string --string "facebook" --algo bm -j DROP

Ques 13. Get Tasks, Threads, Running Processes, Load Average and Uptime using htop command.

Solution:

htop a Linux tool that is used in process-managing and terminal-based system monitoring. It allows real-time monitoring of processes and performs every task to monitor the process in the Linux system

Tasks – Shows the number of open processes present in the system.

Load Average – Shows the average load of the system by CPU.

Uptime – Total system uptime from the last reboot.

Commands:

```
sudo apt-get install htop
```

```
tar -zxvf htop.tar.gz
```

```
cd htop
```

```
./configure
```

```
make
```

```
sudo make install
```

Ques 14. Using netstat command, perform the below operations

- a. To display all the active list of listening port connections.
- b. To display only the active listening TCP ports.
- c. Netstat command in Linux will help to display all the active UNIX port connections.

Solution:

a)

Commands:

1. **Netstat -l** - list only the listening ports.
2. **Netstat -lt** - list only the listening tcp ports.
3. **Netstat -lx** - list only the listening UNIX ports.