

Assignment-I

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File and Directory Operations:

- ls: List files and directories
- cd: Change directory
- pwd: Print working directory
- mkdir: Make directory
- touch: Create an empty file
- cp: Copy files and directories
- mv: Move or rename files and directories
- rm: Remove files and directories
- find: Search for files and directories

All the above commands and their working can be seen in the below Output figure.

A directory named Hello & a file named HelloWorld.txt are created, copied, moved and removed in the following demonstration.

Output:

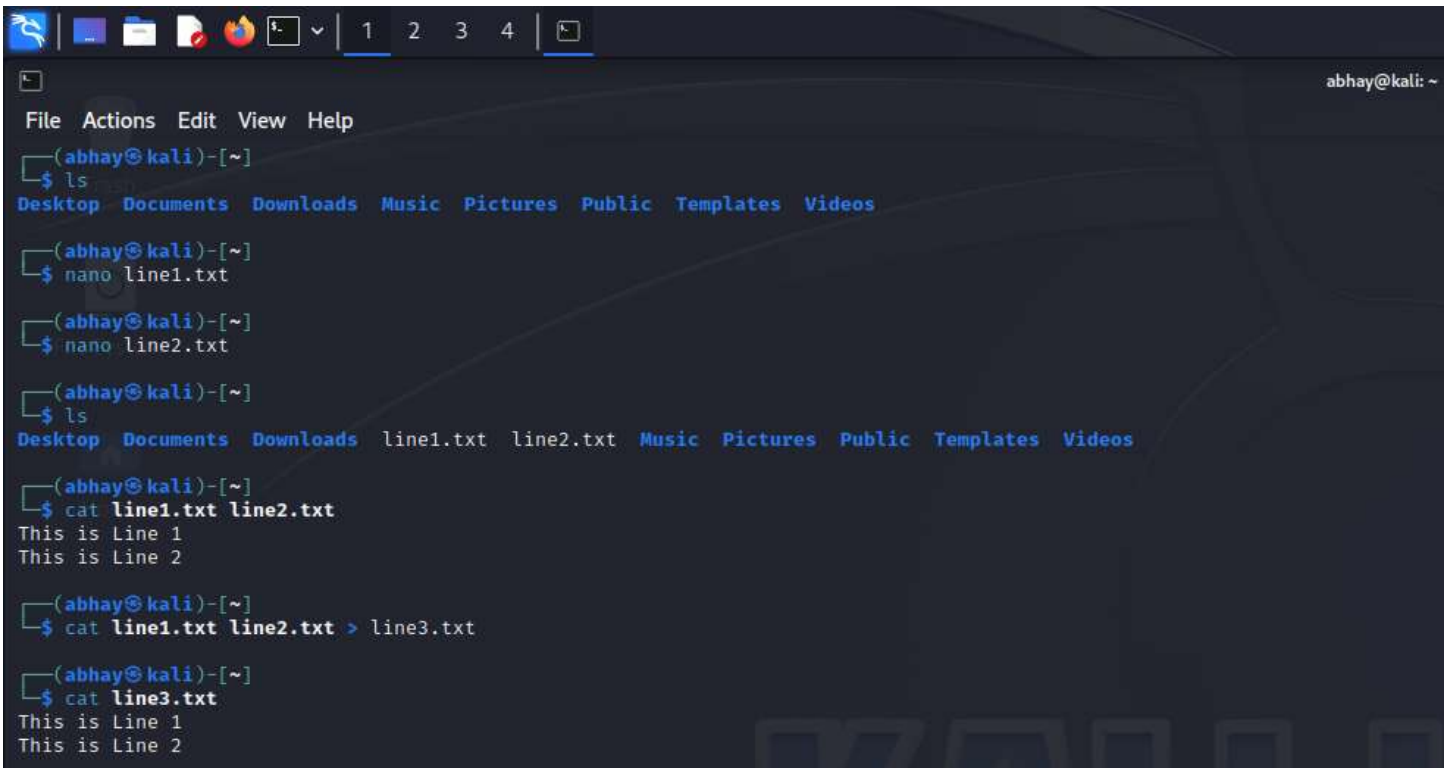
```
abhay@kali: ~  
File Actions Edit View Help  
$ ls  
Desktop Documents Downloads Music Pictures Public Templates Videos  
$ cd Desktop  
$ pwd  
/home/abhay/Desktop  
$ cd  
$ mkdir Hello  
$ touch HelloWorld.txt  
$ ls  
Desktop Documents Downloads Hello HelloWorld.txt Music Pictures Public Templates Videos  
$ cp -r HelloWorld.txt Desktop  
$ cp -r Hello Desktop  
$ cd Desktop  
$ ls  
Hello HelloWorld.txt  
$ cd  
$ mv HelloWorld.txt Hello  
$ ls  
Desktop Documents Downloads Hello Music Pictures Public Templates Videos  
$ cd Hello  
$ ls  
HelloWorld.txt  
$ rm HelloWorld.txt  
$ ls  
$ cd  
$ rmdir Hello  
$ ls  
Desktop Documents Downloads Music Pictures Public Templates Videos  
$ find Desktop -name HelloWorld.txt  
Desktop/HelloWorld.txt  
$ find Desktop -name Hello  
Desktop/Hello  
$
```

File Viewing and Editing:

- cat: Concatenate and display file content
- less: View file content with pagination
- head: Display the beginning of a file
- tail: Display the end of a file
- nano: Text editor for creating and editing files
- vi/vim: Powerful text editor for experienced users

First figure shows the working of 'cat' command. Second one shows output of 'less' command. Third figure displays how the 'nano' command works. Finally, the fourth figure demonstrates 'head' and 'tail' commands.

Output:

A terminal window on a Kali Linux system. The window title is 'abhay@kali: ~'. The terminal shows a series of commands and their outputs. First, 'ls' is run, showing the contents of the home directory. Then, 'nano line1.txt' and 'nano line2.txt' are run to create two files. Another 'ls' command shows these files in the directory. Then, 'cat line1.txt line2.txt' is run, displaying the contents of both files: 'This is Line 1' and 'This is Line 2'. Finally, 'cat line1.txt line2.txt > line3.txt' is run to concatenate the two files into a new file named 'line3.txt'. A final 'cat line3.txt' command shows the combined output: 'This is Line 1' and 'This is Line 2'. The terminal has a dark background with light blue and white text. The top of the window shows a menu bar with 'File', 'Actions', 'Edit', 'View', and 'Help'. The bottom of the window shows a status bar with the username 'abhay@kali' and the current directory '~'.

```
(abhay@kali)-[~]
$ ls
Desktop  Documents  Downloads  Music  Pictures  Public  Templates  Videos

(abhay@kali)-[~]
$ nano line1.txt

(abhay@kali)-[~]
$ nano line2.txt

(abhay@kali)-[~]
$ ls
Desktop  Documents  Downloads  line1.txt  line2.txt  Music  Pictures  Public  Templates  Videos

(abhay@kali)-[~]
$ cat line1.txt line2.txt
This is Line 1
This is Line 2

(abhay@kali)-[~]
$ cat line1.txt line2.txt > line3.txt

(abhay@kali)-[~]
$ cat line3.txt
This is Line 1
This is Line 2
```

File Actions Edit View Help

This is Line 1
This is Line 2



File System



Home

KALI

"the quieter you become, the

(END)

```
GNU nano 7.2 long.txt
Alexander City
Andalusia
Anniston
Athens
Atmore
Auburn
Bessemer
Birmingham
Chickasaw
Clanton
Cullman
Decatur
Demopolis
Dothan
Enterprise
Etowah
Florence
Fort Payne
Gadsden
Greenville
Guntersville
Huntsville
Jasper
Marion
Mobile
Montgomery
Opelika
Ozark
Phenix City
Prichard
Scottsboro
Selma
Sheffield
Sylacauga
Talladega
Troy
Tuscaloosa
Tuscumbia
Tuskegee
```

KALI LINUX
"the quieter you become, the more you are able to hear"

Help Exit Write Out Read File Where Is Replace Cut Paste Execute Justify Location Go To Line Read 39 lines Undo Redo Set Mark Copy To Bracket Where Was Previous Next Back Forward Prev Word Next Word Home End

```
abhay@kali: ~  
File Actions Edit View Help  
(abhay@kali)-[~]  
$ nano long.txt  
(abhay@kali)-[~]  
$ ls  
Desktop Documents Downloads line1.txt line2.txt line3.txt long.txt Music Pictures Public Templates Videos  
(abhay@kali)-[~]  
$ head long.txt  
Alexander City  
Andalusia  
Anniston  
Athens  
Atmore  
Auburn  
Bessemer  
Birmingham  
Chickasaw  
Clanton  
(abhay@kali)-[~]  
$ tail long.txt  
Prichard  
Scottsboro  
Selma  
Sheffield  
Sylacauga  
Talladega  
Troy  
Tuscaloosa  
Tuscumbia  
Tuskegee
```

File Permissions:

- chmod: Change file permissions
- chown: Change file owner
- chgrp: Change file group

Numeric mode: Using a three-digit number that represents the permissions. Each digit corresponds to the owner, group, and others, respectively, with the following values:

- 0: No permission
- 1: Execute permission
- 2: Write permission
- 4: Read permission

The sum of these values gives the desired permission. For example:

To set read and write permissions for the owner, and read-only permissions for the group and others: 'chmod 644 file'

To give full permissions to the owner, and no permissions to the group and others: 'chmod 700 file'

Output:



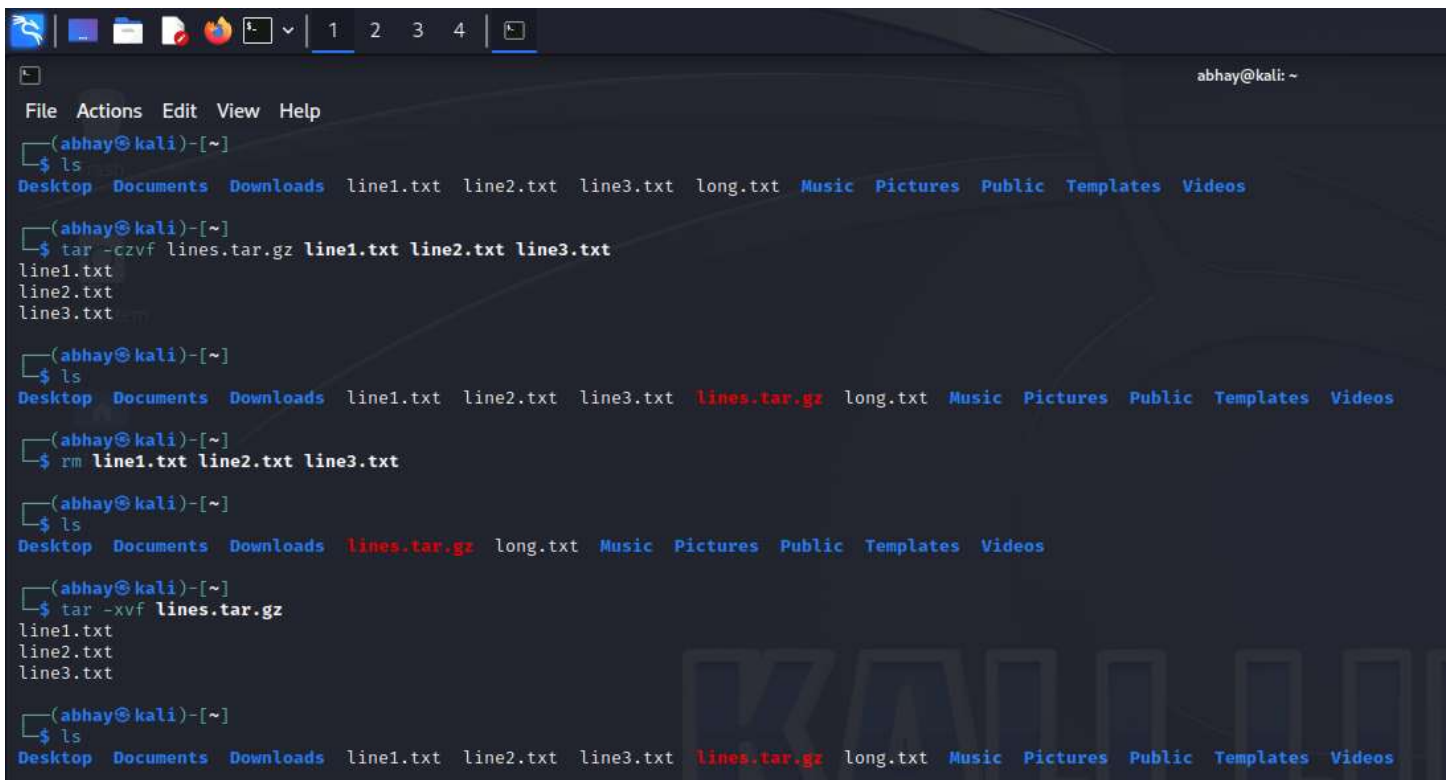
```
abhay@kali: ~  
File Actions Edit View Help  
(abhay@kali)-[~]  
$ ls  
Desktop Documents Downloads line1.txt line2.txt line3.txt long.txt Music Pictures Public Templates Videos  
(abhay@kali)-[~]  
$ chmod 644 long.txt  
(abhay@kali)-[~]  
$ chmod 700 line1.txt
```

Similarly 'chown' and 'chgrp' commands can be used to change owners and groups of a file but there no more users so the command will be invalid.

File Compression and Archiving:

- tar: Archive files
- gzip: Compress files
- unzip: Extract files from a ZIP archive

Output:



```
(abhay@kali)-[~]
$ ls
Desktop  Documents  Downloads  line1.txt  line2.txt  line3.txt  long.txt  Music  Pictures  Public  Templates  Videos

(abhay@kali)-[~]
$ tar -czvf lines.tar.gz line1.txt line2.txt line3.txt
line1.txt
line2.txt
line3.txt

(abhay@kali)-[~]
$ ls
Desktop  Documents  Downloads  line1.txt  line2.txt  line3.txt  lines.tar.gz  long.txt  Music  Pictures  Public  Templates  Videos

(abhay@kali)-[~]
$ rm line1.txt line2.txt line3.txt

(abhay@kali)-[~]
$ ls
Desktop  Documents  Downloads  lines.tar.gz  long.txt  Music  Pictures  Public  Templates  Videos

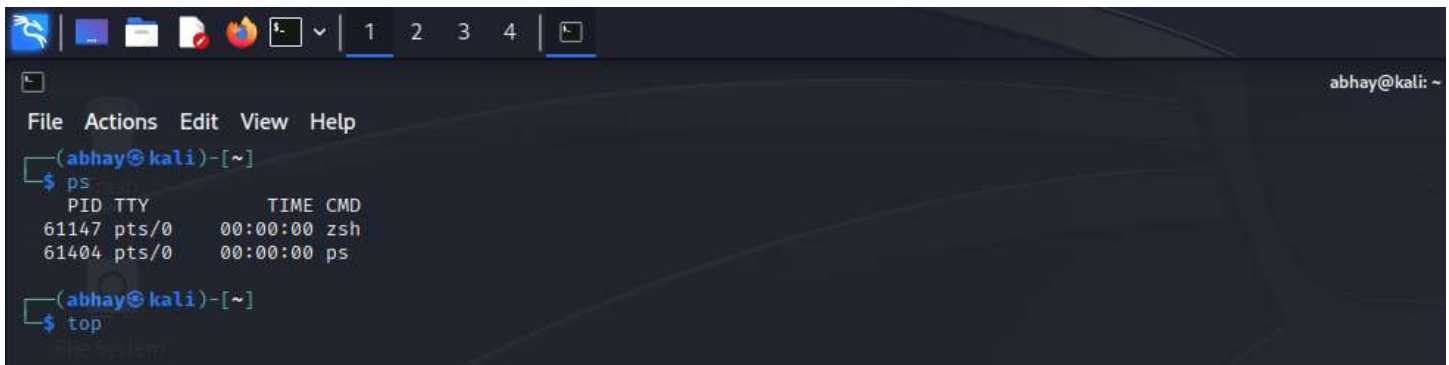
(abhay@kali)-[~]
$ tar -xvf lines.tar.gz
line1.txt
line2.txt
line3.txt

(abhay@kali)-[~]
$ ls
Desktop  Documents  Downloads  line1.txt  line2.txt  line3.txt  lines.tar.gz  long.txt  Music  Pictures  Public  Templates  Videos
```

Process Management:

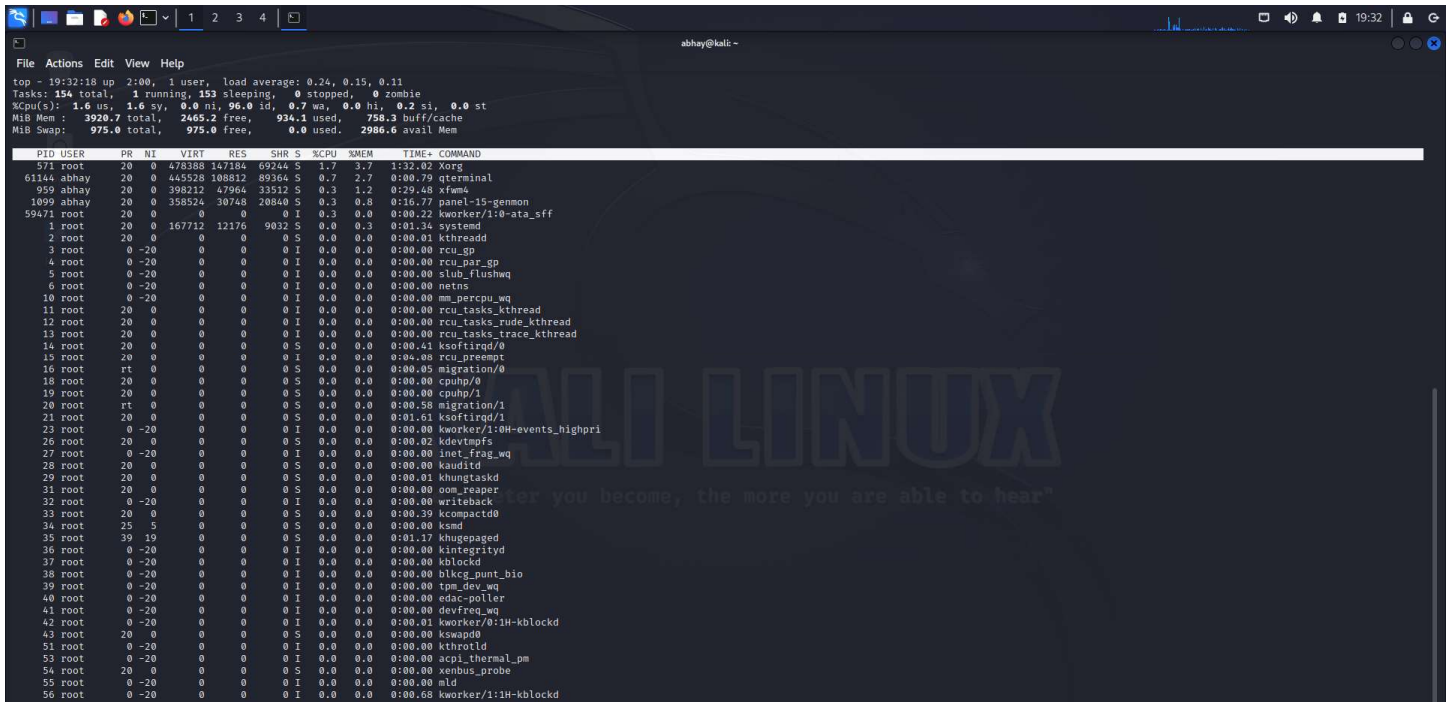
- ps: List running processes
- top: Display real-time system information and processes
- kill: Terminate processes
- bg: Run processes in the background
- fg: Bring background processes to the foreground

Output:



```
(abhay@kali)-[~]
$ ps
  PID TTY          TIME CMD
 61147 pts/0    00:00:00 zsh
 61404 pts/0    00:00:00 ps

(abhay@kali)-[~]
$ top
```



```
top - 19:32:18 up 2:00, 1 user, load average: 0.24, 0.15, 0.11
Tasks: 154 total, 1 running, 153 sleeping, 0 stopped, 0 zombie
%Cpu(s): 1.6 us, 1.6 sy, 0.0 ni, 96.0 id, 0.7 wa, 0.0 hi, 0.2 si, 0.0 st
MiB Mem : 3920.7 total, 2465.2 free, 934.1 used, 758.3 buff/cache
MiB Swap: 975.0 total, 975.0 free, 0.0 used, 2986.6 avail Mem

  PID USER      PR  NI  VIRT  RES  SHR  S  %CPU  %MEM    TIME+  COMMAND
 571 root        20   0 478388 147184 69244 S   1.7   3.7   1:32.02 Xorg
61144 abhay      20   0 445528 108812 89364 S   0.7   2.7   0:00.79 qterminal
 959 abhay      20   0 398212 47964 33512 S   0.3   1.2   0:29.48 xfwm4
1099 abhay      20   0 358524 30748 20840 S   0.3   0.8   0:16.77 panel-15-genmon
59471 root        20   0 0 0 0 I   0.3   0.0   0:00.22 kworker/1:0-ata_sff
 1 root        20   0 167712 12176 9032 S   0.0   0.2   0:01.24 systemd
 2 root        20   0 0 0 0 S   0.0   0.0   0:00.01 kthreadd
 3 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 rcu_gp
 4 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 rcu_par_gp
 5 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 slub_flushwq
 6 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 netns
10 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 mm_percpu_wq
11 root        20   0 0 0 0 I   0.0   0.0   0:00.00 rcu_tasks_kthreadd
12 root        20   0 0 0 0 I   0.0   0.0   0:00.00 rcu_tasks_rude_kthreadd
13 root        20   0 0 0 0 I   0.0   0.0   0:00.00 rcu_tasks_trace_kthreadd
14 root        20   0 0 0 0 S   0.0   0.0   0:00.41 ksoftirqd/0
15 root        20   0 0 0 0 I   0.0   0.0   0:04.00 rcu_preempt
16 root        rt  0 0 0 0 S   0.0   0.0   0:00.05 migration/0
18 root        20   0 0 0 0 S   0.0   0.0   0:00.00 cpuhp/0
19 root        20   0 0 0 0 S   0.0   0.0   0:00.00 cpuhp/1
20 root        rt  0 0 0 0 S   0.0   0.0   0:00.58 migration/1
21 root        20   0 0 0 0 S   0.0   0.0   0:01.61 ksoftirqd/1
23 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 kworker/1:0H-events_highpri
26 root        20   0 0 0 0 S   0.0   0.0   0:00.02 kdevtmpfs
27 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 inet_frag_wq
28 root        20   0 0 0 0 S   0.0   0.0   0:00.00 kauditd
29 root        20   0 0 0 0 S   0.0   0.0   0:00.01 khungtaskd
31 root        20   0 0 0 0 S   0.0   0.0   0:00.00 oom_reaper
32 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 writeback
33 root        20   0 0 0 0 S   0.0   0.0   0:00.39 kcompactd0
34 root        25   5 0 0 0 S   0.0   0.0   0:00.00 ksmd
35 root        39  19 0 0 0 S   0.0   0.0   0:01.17 khugepaged
36 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 kintegrityd
37 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 kblockd
38 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 blkcg_punt_bio
39 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 tpm_dev_wq
40 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 edac-poller
41 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 devfreq_wq
42 root        0 -20 0 0 0 I   0.0   0.0   0:00.01 kworker/0:1H-kblockd
43 root        20   0 0 0 0 S   0.0   0.0   0:00.00 kswapd0
51 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 kthrotld
53 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 acpi_thermal_pm
54 root        20   0 0 0 0 S   0.0   0.0   0:00.00 xenbus_probe
55 root        0 -20 0 0 0 I   0.0   0.0   0:00.00 mld
56 root        0 -20 0 0 0 I   0.0   0.0   0:00.68 kworker/1:1H-kblockd
```


System Information:

- uname: Print system information
- df: Display disk space usage
- free: Display memory usage
- uptime: Show system uptime
- who: Display logged-in users
- w: Display logged-in users and their activities

Output:



```
(abhay@kali)-[~]
$ uname
Linux

(abhay@kali)-[~]
$ df
Filesystem      1K-blocks    Used Available Use% Mounted on
udev            1966832      0   1966832  0% /dev
tmpfs           401480      960   400520  1% /run
/dev/sda1       24640544 12705716 10657800 55% /
tmpfs           2007388      0   2007388  0% /dev/shm
tmpfs           5120        0     5120  0% /run/lock
tmpfs           401476      84   401392  1% /run/user/1000

(abhay@kali)-[~]
$ free
              total        used        free      shared  buff/cache   available
Mem:      4014776      929752      2550816         18288         776736      3085024
Swap:      998396           0         998396

(abhay@kali)-[~]
$ uptime
19:38:49 up 2:07, 1 user, load average: 0.11, 0.09, 0.09

(abhay@kali)-[~]
$ who
abhay    tty7      2023-05-28 17:32 (:0)

(abhay@kali)-[~]
$ w
19:38:55 up 2:07, 1 user, load average: 0.10, 0.08, 0.09
USER      TTY      FROM          LOGIN@   IDLE   JCPU   PCPU   WHAT
abhay     tty7      :0            17:32    2:07m  1:37   0.42s  xfce4-session

(abhay@kali)-[~]
$
```

Networking:

- ifconfig: Configure network interfaces
- ping: Send ICMP echo requests to a network host
- ssh: Securely connect to a remote system
- scp: Securely copy files between systems
- wget: Download files from the web

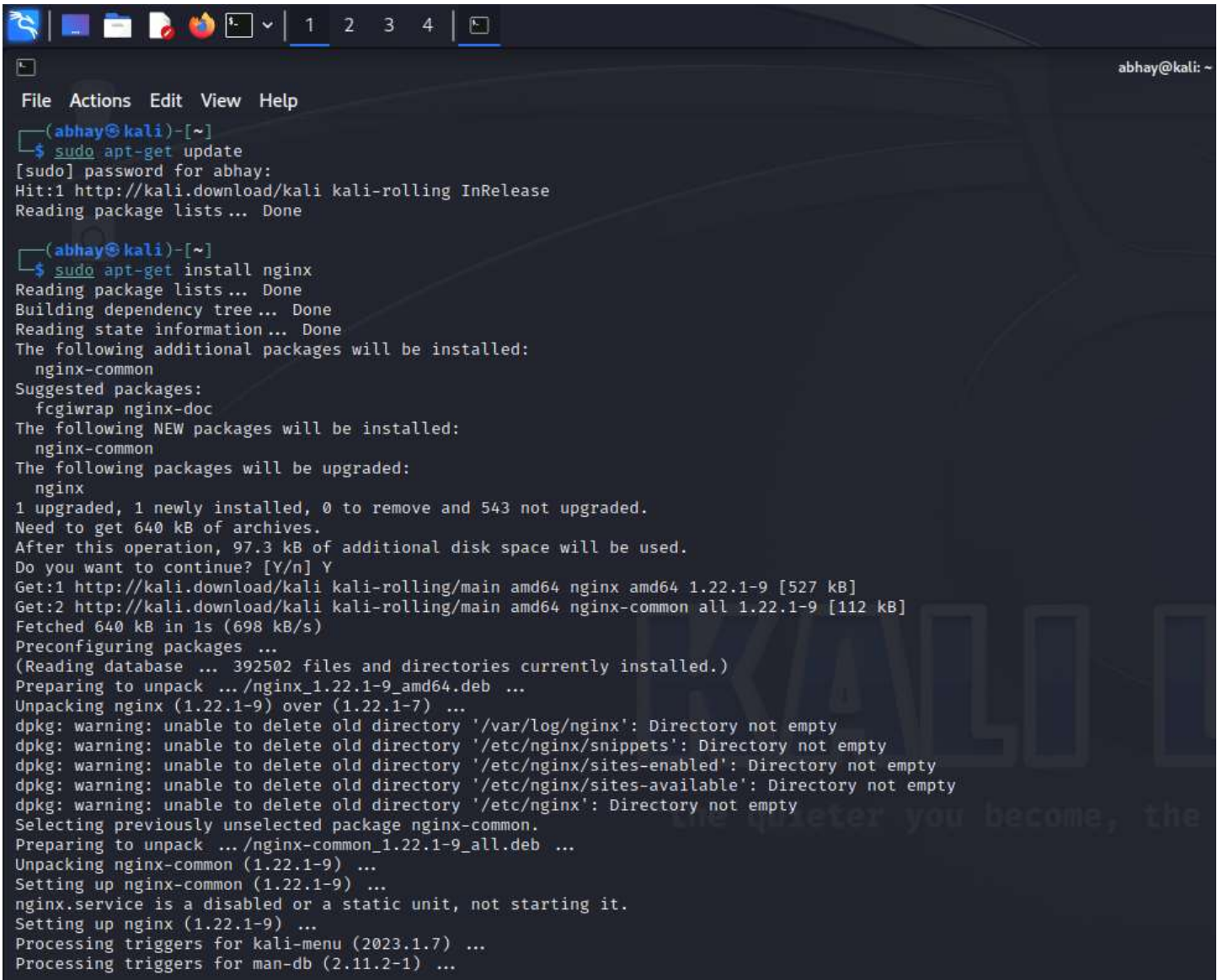
Output:

```
abhay@kali: ~  
File Actions Edit View Help  
(abhay@kali)-[~]  
$ ifconfig  
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
    inet 10.0.2.15 netmask 255.255.255.0 broadcast 10.0.2.255  
    inet6 fe80::a00:27ff:fede:36d0 prefixlen 64 scopeid 0x20<link>  
    ether 08:00:27:de:36:d0 txqueuelen 1000 (Ethernet)  
    RX packets 15658 bytes 19869849 (18.9 MiB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 4243 bytes 645075 (629.9 KiB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536  
    inet 127.0.0.1 netmask 255.0.0.0  
    inet6 ::1 prefixlen 128 scopeid 0x10<host>  
    loop txqueuelen 1000 (Local Loopback)  
    RX packets 4 bytes 240 (240.0 B)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 4 bytes 240 (240.0 B)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
(abhay@kali)-[~]  
$ ping google.com  
PING google.com (142.250.183.14) 56(84) bytes of data:  
64 bytes from bom07s30-in-f14.1e100.net (142.250.183.14): icmp_seq=1 ttl=111 time=33.6 ms  
64 bytes from bom07s30-in-f14.1e100.net (142.250.183.14): icmp_seq=2 ttl=111 time=33.8 ms  
64 bytes from bom07s30-in-f14.1e100.net (142.250.183.14): icmp_seq=3 ttl=111 time=34.1 ms  
64 bytes from bom07s30-in-f14.1e100.net (142.250.183.14): icmp_seq=4 ttl=111 time=34.4 ms  
64 bytes from bom07s30-in-f14.1e100.net (142.250.183.14): icmp_seq=5 ttl=111 time=33.8 ms  
64 bytes from bom07s30-in-f14.1e100.net (142.250.183.14): icmp_seq=6 ttl=111 time=33.9 ms  
64 bytes from bom07s30-in-f14.1e100.net (142.250.183.14): icmp_seq=7 ttl=111 time=34.9 ms  
^C  
--- google.com ping statistics ---  
7 packets transmitted, 7 received, 0% packet loss, time 6016ms  
rtt min/avg/max/mdev = 33.646/34.073/34.915/0.400 ms  
  
(abhay@kali)-[~]  
$ wget https://www.google.com/doodles/gerardus-mercators-503rd-birthday  
--2023-05-28 19:45:37-- https://www.google.com/doodles/gerardus-mercators-503rd-birthday  
Resolving www.google.com (www.google.com)... 142.250.182.100, 2404:6800:4007:81c::2004  
Connecting to www.google.com (www.google.com)|142.250.182.100|:443... connected.  
HTTP request sent, awaiting response... 200 OK  
Length: 3854531 (3.7M) [text/html]  
Saving to: 'gerardus-mercators-503rd-birthday'  
  
gerardus-mercators-503rd-birthday 100%[=====]  
  
2023-05-28 19:45:42 (1.70 MB/s) - 'gerardus-mercators-503rd-birthday' saved [3854531/3854531]  
  
(abhay@kali)-[~]  
$
```

System Administration:

- sudo: Execute commands with superuser privileges
- apt-get: Package management for Debian-based distributions
- yum: Package management for Red Hat-based distributions
- systemctl: Manage system services
- crontab: Schedule recurring tasks
- useradd: Add a new user
- passwd: Change user password

Output:

A terminal window screenshot showing the installation of nginx on Kali Linux. The user is logged in as abhay@kali. The terminal shows the execution of 'sudo apt-get update' and 'sudo apt-get install nginx'. The output includes package lists, dependency trees, and disk space requirements. The installation of nginx 1.22.1-9 is shown, along with the installation of nginx-common. The terminal also displays warnings about existing directories and the status of the nginx service.

```
(abhay@kali)-[~]
$ sudo apt-get update
[sudo] password for abhay:
Hit:1 http://kali.download/kali kali-rolling InRelease
Reading package lists... Done

(abhay@kali)-[~]
$ sudo apt-get install nginx
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  nginx-common
Suggested packages:
  fcgiwrap nginx-doc
The following NEW packages will be installed:
  nginx-common
The following packages will be upgraded:
  nginx
1 upgraded, 1 newly installed, 0 to remove and 543 not upgraded.
Need to get 640 kB of archives.
After this operation, 97.3 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://kali.download/kali kali-rolling/main amd64 nginx amd64 1.22.1-9 [527 kB]
Get:2 http://kali.download/kali kali-rolling/main amd64 nginx-common all 1.22.1-9 [112 kB]
Fetched 640 kB in 1s (698 kB/s)
Preconfiguring packages ...
(Reading database ... 392502 files and directories currently installed.)
Preparing to unpack .../nginx_1.22.1-9_amd64.deb ...
Unpacking nginx (1.22.1-9) over (1.22.1-7) ...
dpkg: warning: unable to delete old directory '/var/log/nginx': Directory not empty
dpkg: warning: unable to delete old directory '/etc/nginx/snippets': Directory not empty
dpkg: warning: unable to delete old directory '/etc/nginx/sites-enabled': Directory not empty
dpkg: warning: unable to delete old directory '/etc/nginx/sites-available': Directory not empty
dpkg: warning: unable to delete old directory '/etc/nginx': Directory not empty
Selecting previously unselected package nginx-common.
Preparing to unpack .../nginx-common_1.22.1-9_all.deb ...
Unpacking nginx-common (1.22.1-9) ...
Setting up nginx-common (1.22.1-9) ...
nginx.service is a disabled or a static unit, not starting it.
Setting up nginx (1.22.1-9) ...
Processing triggers for kali-menu (2023.1.7) ...
Processing triggers for man-db (2.11.2-1) ...
```

```
GNU nano 7.2 /tmp/crontab.S916RP/crontab
# Edit this file to introduce tasks to be run by cron.
#
# Each task to run has to be defined through a single line
# indicating with different fields when the task will be run
# and what command to run for the task
#
# To define the time you can provide concrete values for
# minute (m), hour (h), day of month (dom), month (mon),
# and day of week (dow) or use '*' in these fields (for 'any').
#
# Notice that tasks will be started based on the cron's system
# daemon's notion of time and timezones.
#
# Output of the crontab jobs (including errors) is sent through
# email to the user the crontab file belongs to (unless redirected).
#
# For example, you can run a backup of all your user accounts
# at 5 a.m every week with:
# 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
#
```

```
File Actions Edit View Help
(abhay@kali)-[~]
$ sudo systemctl status apache2
[sudo] password for abhay:
o apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; disabled; preset: disabled)
   Active: inactive (dead)
   Docs: https://httpd.apache.org/docs/2.4/

(abhay@kali)-[~]
$ crontab -e
no crontab for abhay - using an empty one

Select an editor. To change later, run 'select-editor'.
 1. /bin/nano      ← easiest
 2. /usr/bin/vim.basic
 3. /usr/bin/vim.tiny

Choose 1-3 [1]: 1
No modification made
```



```
File Actions Edit View Help
(abhay@kali)-[~]
$ sudo systemctl status apache2
[sudo] password for abhay:
o apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; disabled; preset: disabled)
   Active: inactive (dead)
   Docs: https://httpd.apache.org/docs/2.4/

(abhay@kali)-[~]
$ crontab -e
no crontab for abhay - using an empty one

Select an editor. To change later, run 'select-editor'.
 1. /bin/nano      ← easiest
 2. /usr/bin/vim.basic
 3. /usr/bin/vim.tiny

Choose 1-3 [1]: 1
No modification made

(abhay@kali)-[~]
$ sudo useradd test_user

(abhay@kali)-[~]
$ sudo userdel test_user

(abhay@kali)-[~]
$ sudo passwd abhay
New password:
Retype new password:
passwd: password updated successfully

(abhay@kali)-[~]
$
```