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Level 5 – CT5052 Network Operating System

Assessment Type

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1. Introduction

The main program which maintains computer hardware and software features that provides important services that are needed for application to operate. This process is known as operating System. Operating System includes Linux, mac OS and Windows. In 1970, Unix Operating System which is strong, multiuser and perform multiple tasks was introduced and implemented.

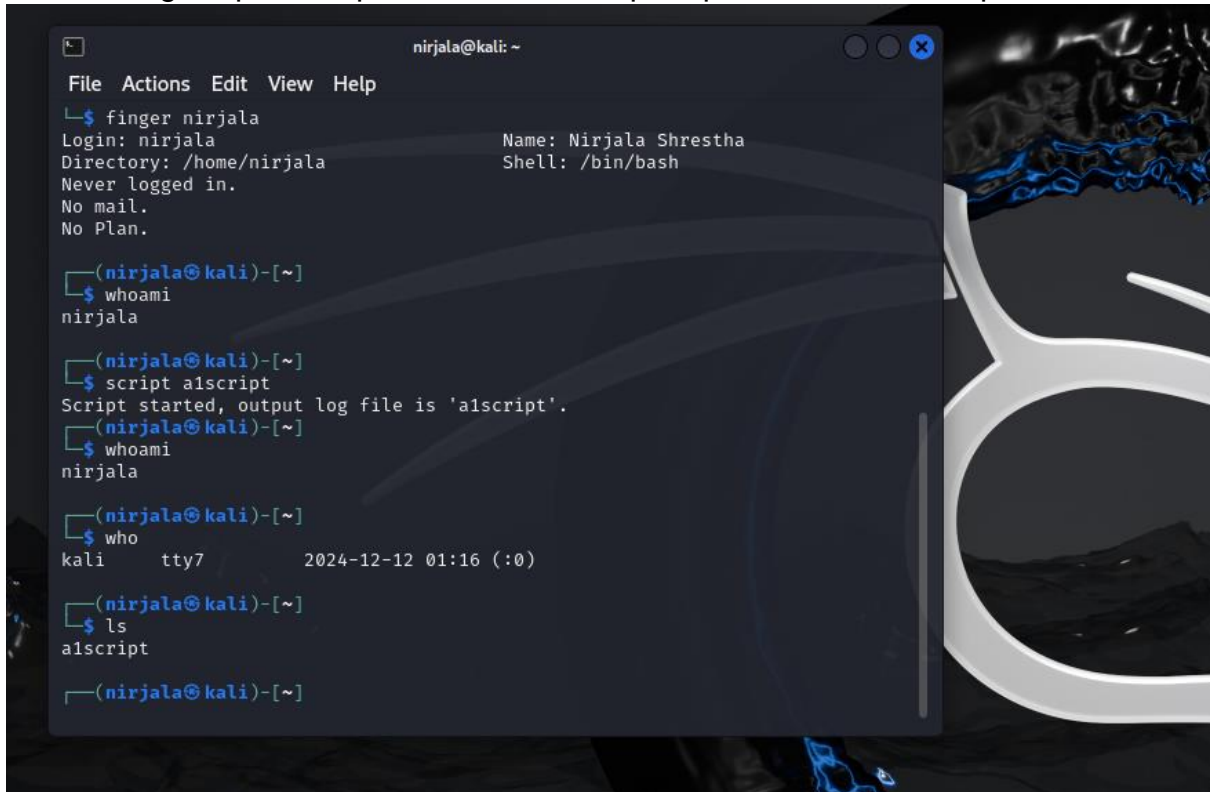
Unix OS is commonly used in work places, mainframes and computer system and it is widely recognized because of its reliability, safety and creativity. It provides a base and inspiration for various new technologies because it is simple to understand, light weight and highly efficient. The key objectives of Unix Operating System are mentioned below:

- i. Portability: Unix OS is also more accessible over many kinds of hardware because it is designed in the C programming language
- ii. Stability: The security and stability of Unix operating system are widely recognized. A lot of computers having Unix based operating system don't have to updated and restarted several years or months.
- iii. Security: Unix is a dependable operating system for important and basic projects as it provides excellent protections while accessing the file, security of data and authorization of users.
- iv. Networking: Unix OS developed networking functions that offers reliable communications between systems. It is important for organizations as well as enterprise systems.
- v. Modularity: The main concept of Unix set a important value on modularity, that lets all applications to carryout a single operation properly. It works together with many applications to achieve higher level skills.

Kali Linux (Kali) is a Linux Distribution system that was developed with a focus on the penetration testing task. Previously, Kali Linux was known as Back track, which itself is a merger between three different live Linux penetration testing distribution: IWHAX, WHOPPIX, and auditor. (Lee Allen, Apr 7, 2014)

2. Workshop 6

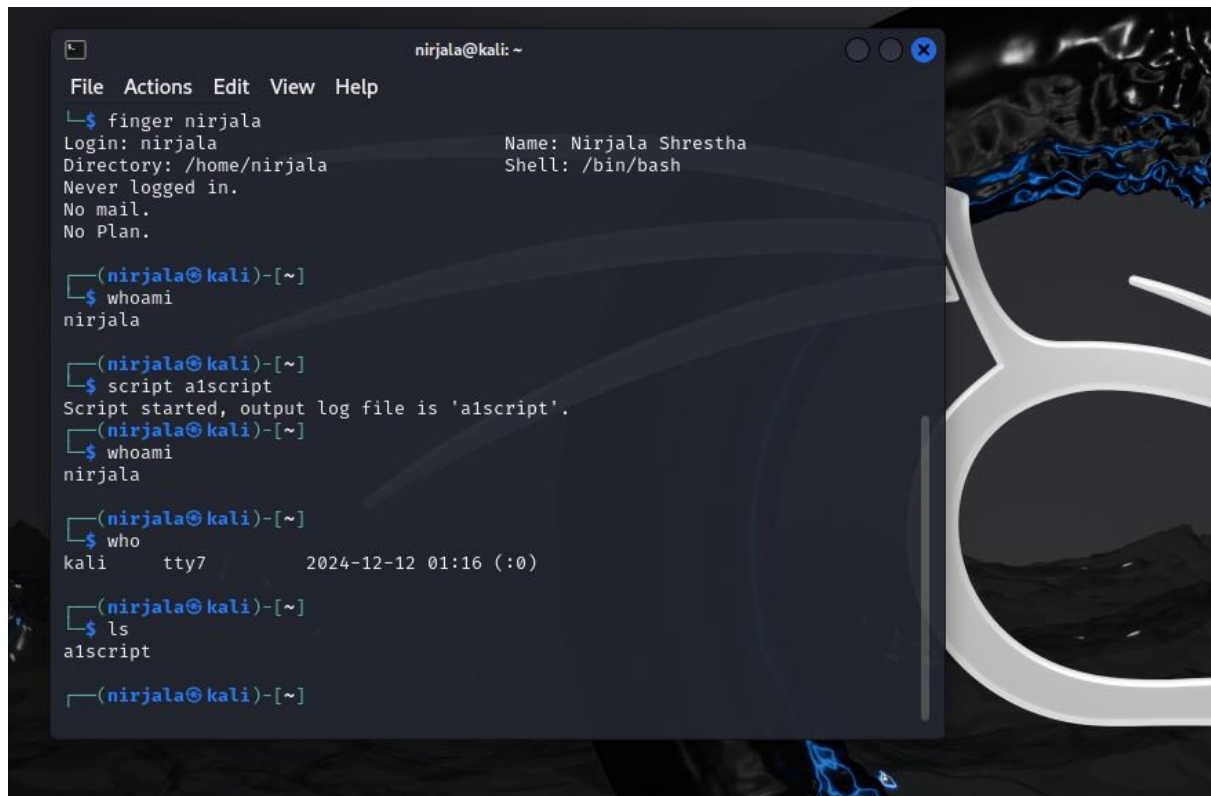
1. Type script a1script at the prompt. That's the digit one (1) after the letter "a"—this is assignment one, not assignment el. The system will respond with
 - Inserting script a1script at the command prompt to see what it responds.



```
nirjala@kali: ~  
File Actions Edit View Help  
$ finger nirjala  
Login: nirjala                               Name: Nirjala Shrestha  
Directory: /home/nirjala                     Shell: /bin/bash  
Never logged in.  
No mail.  
No Plan.  
  
(nirjala@kali)-[~]  
$ whoami  
nirjala  
  
(nirjala@kali)-[~]  
$ script a1script  
Script started, output log file is 'a1script'.  
(nirjala@kali)-[~]  
$ whoami  
nirjala  
  
(nirjala@kali)-[~]  
$ who  
kali      tty7      2024-12-12 01:16 (:0)  
  
(nirjala@kali)-[~]  
$ ls  
a1script  
  
(nirjala@kali)-[~]
```

Figure 1: Inserting script a1script

2. Type whoami to see your username.
-Inserting whoami command to see username.

A terminal window titled 'nirjala@kali: ~' with a menu bar (File, Actions, Edit, View, Help). The terminal shows the following commands and output:

```
$ finger nirjala
Login: nirjala                      Name: Nirjala Shrestha
Directory: /home/nirjala           Shell: /bin/bash
Never logged in.
No mail.
No Plan.

(nirjala@kali)-[~]
$ whoami
nirjala

(nirjala@kali)-[~]
$ script a1script
Script started, output log file is 'a1script'.
(nirjala@kali)-[~]
$ whoami
nirjala

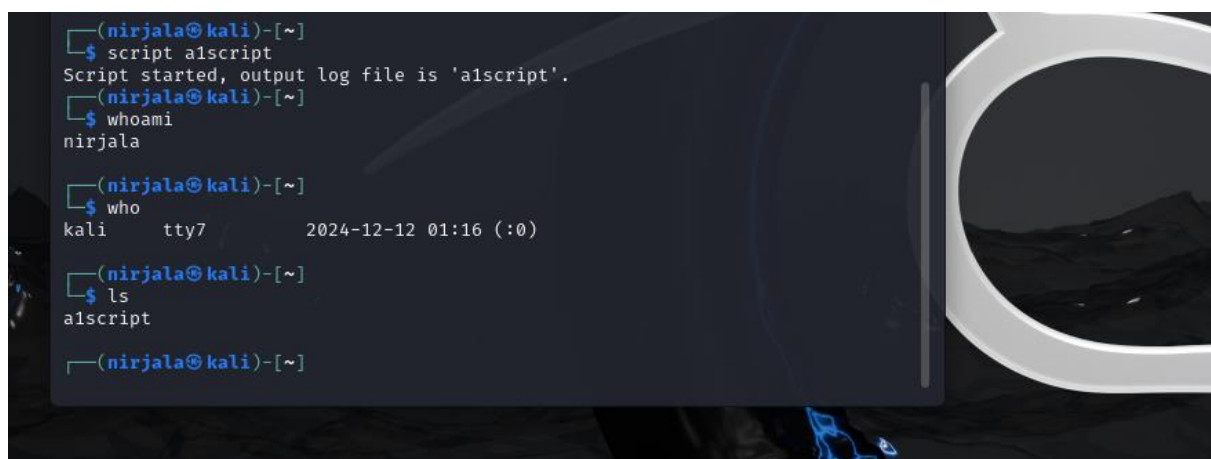
(nirjala@kali)-[~]
$ who
kali      tty7      2024-12-12 01:16 (:0)

(nirjala@kali)-[~]
$ ls
a1script

(nirjala@kali)-[~]
```

Figure 2: Inserting who am I to see username

3. Type who to see a list of everyone on the system.
- Inserting who to see a list of everyone on system.

A terminal window titled 'nirjala@kali: ~' with a menu bar (File, Actions, Edit, View, Help). The terminal shows the following commands and output:

```
(nirjala@kali)-[~]
$ script a1script
Script started, output log file is 'a1script'.
(nirjala@kali)-[~]
$ whoami
nirjala

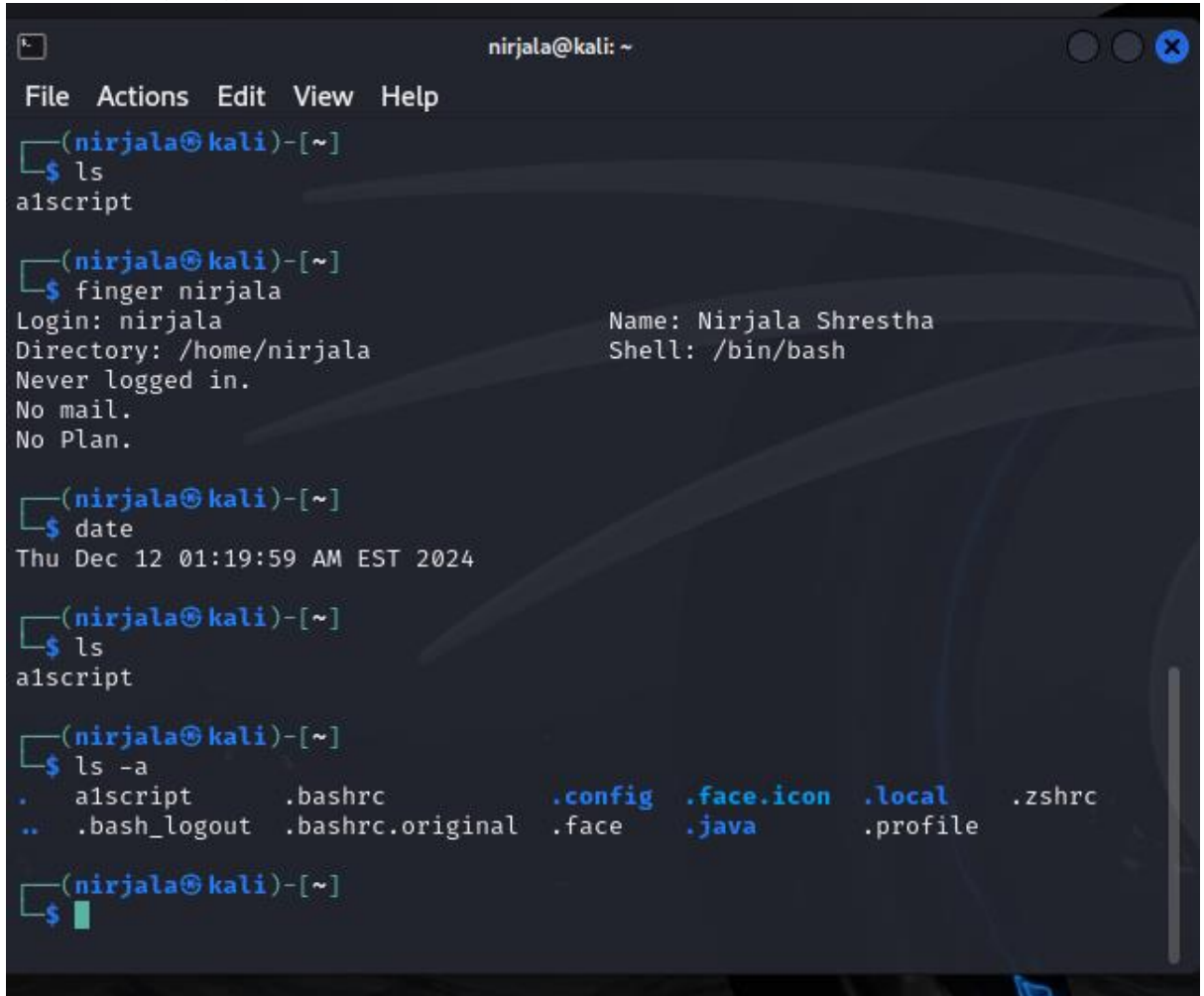
(nirjala@kali)-[~]
$ who
kali      tty7      2024-12-12 01:16 (:0)

(nirjala@kali)-[~]
$ ls
a1script

(nirjala@kali)-[~]
```

Figure 3: Inserting who to see a list

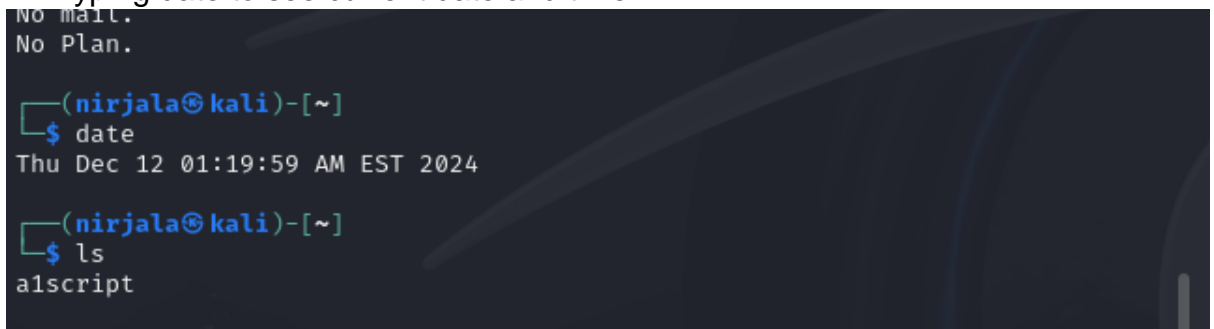
4. Type `finger linuxnnn`, (where `linuxnnn` is your username) to see more information about your account.
 - Inserting finger Nirjala to see more account information

A terminal window titled 'nirjala@kali: ~' with a menu bar (File, Actions, Edit, View, Help). The prompt is '(nirjala@kali)-[~]'. The user enters '\$ ls', showing 'alscript'. Then they enter '\$ finger nirjala', displaying account details: 'Login: nirjala', 'Directory: /home/nirjala', 'Never logged in.', 'No mail.', 'No Plan.', 'Name: Nirjala Shrestha', and 'Shell: /bin/bash'. Next, they enter '\$ date', showing 'Thu Dec 12 01:19:59 AM EST 2024'. Then '\$ ls' again, showing 'alscript'. Finally, they enter '\$ ls -a', showing a list of hidden files: '. alscript', '.. .bash_logout', '.bashrc', '.bashrc.original', '.config', '.face', '.face.icon', '.java', '.local', '.profile', and '.zshrc'.

```
(nirjala@kali)-[~]  
$ ls  
alscript  
  
(nirjala@kali)-[~]  
$ finger nirjala  
Login: nirjala  
Directory: /home/nirjala  
Never logged in.  
No mail.  
No Plan.  
Name: Nirjala Shrestha  
Shell: /bin/bash  
  
(nirjala@kali)-[~]  
$ date  
Thu Dec 12 01:19:59 AM EST 2024  
  
(nirjala@kali)-[~]  
$ ls  
alscript  
  
(nirjala@kali)-[~]  
$ ls -a  
. alscript      .bashrc        .config        .face.icon     .local         .zshrc  
.. .bash_logout .bashrc.original .face          .java          .profile
```

Figure 4: Inserting finger linuxnn

5. Type `date`, to see today's date and the current time.
 - Typing `date` to see current date and time.

A terminal window showing the continuation of the previous session. The prompt is '(nirjala@kali)-[~]'. The user enters '\$ date', showing 'Thu Dec 12 01:19:59 AM EST 2024'. Then they enter '\$ ls', showing 'alscript'.

```
(nirjala@kali)-[~]  
$ date  
Thu Dec 12 01:19:59 AM EST 2024  
  
(nirjala@kali)-[~]  
$ ls  
alscript
```

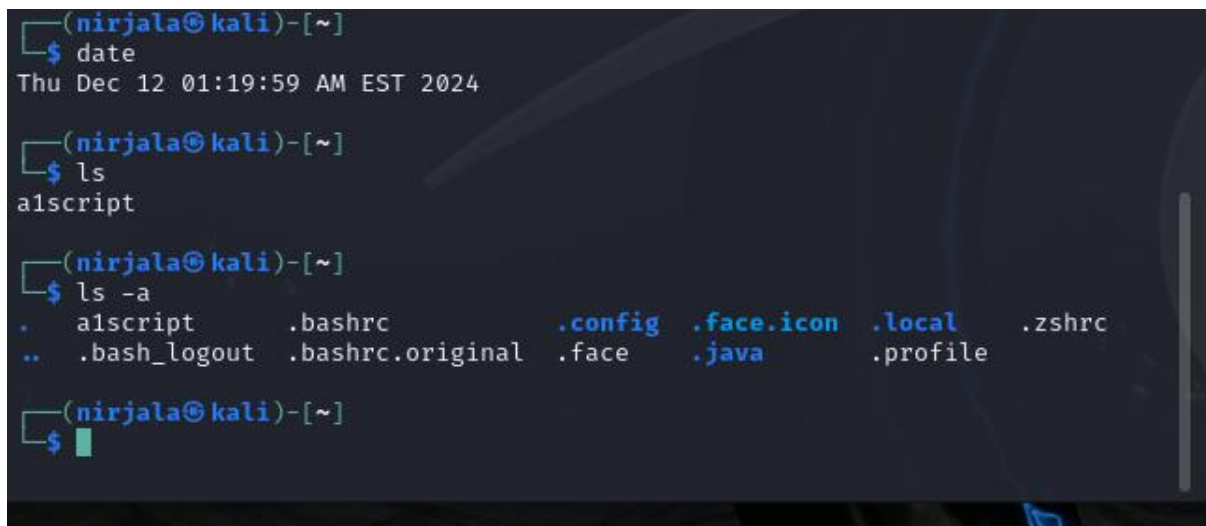
Figure 5: Inserting data to see date and current time

6. What files do you have? Type these three commands. Each one produces different output.

```
ls  
ls -a  
ls -a -l
```

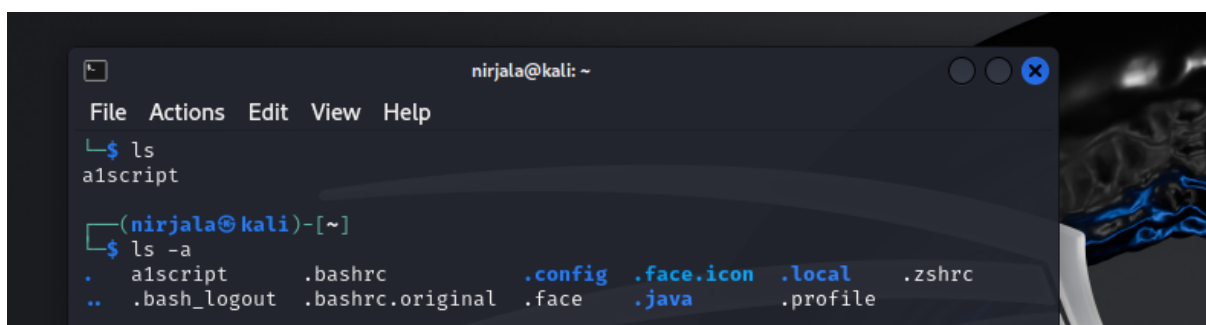
What's the difference?

- The difference is in ls: gives only a list of files and folders of file system.
- ls -a: list all of the files and folders, which also consists files that are hidden (that are denoted by. dot)
- ls -a -l: lists every files and folders also the one that are hidden and provide full instructions on every one of them. It also combines -a -l.



```
(nirjala@kali)-[~]  
$ date  
Thu Dec 12 01:19:59 AM EST 2024  
  
(nirjala@kali)-[~]  
$ ls  
alscript  
  
(nirjala@kali)-[~]  
$ ls -a  
.   alscript      .bashrc      .config      .face.icon   .local       .zshrc  
..  .bash_logout  .bashrc.original .face        .java        .profile
```

Figure 6: Output of ls



```
nirjala@kali: ~  
File Actions Edit View Help  
$ ls  
alscript  
  
(nirjala@kali)-[~]  
$ ls -a  
.   alscript      .bashrc      .config      .face.icon   .local       .zshrc  
..  .bash_logout  .bashrc.original .face        .java        .profile
```

Figure 7: Output of ls -a


```

(nirjala@kali)-[~]
$ ls -a
.  alscrypt      .bashrc      .config      .face.icon   .local      .zshrc
.. .bash_logout .bashrc.original .face      .java      .profile

(nirjala@kali)-[~]
$ ls -al
total 64
drwx----- 5 nirjala nirjala 4096 Dec 12 01:18 .
drwxr-xr-x 4 root root 4096 Dec 12 01:16 ..
-rw-r--r-- 1 nirjala nirjala 0 Dec 12 01:18 alscrypt
-rw-r--r-- 1 nirjala nirjala 220 Dec 12 01:16 .bash_logout
-rw-r--r-- 1 nirjala nirjala 5551 Dec 12 01:16 .bashrc
-rw-r--r-- 1 nirjala nirjala 3526 Dec 12 01:16 .bashrc.original
drwxr-xr-x 6 nirjala nirjala 4096 Dec 12 01:16 .config
-rw-r--r-- 1 nirjala nirjala 11759 Dec 12 01:16 .face
lrwxrwxrwx 1 nirjala nirjala 5 Dec 12 01:16 .face.icon -> .face
drwxr-xr-x 3 nirjala nirjala 4096 Dec 12 01:16 .java
drwxr-xr-x 3 nirjala nirjala 4096 Dec 12 01:16 .local
-rw-r--r-- 1 nirjala nirjala 807 Dec 12 01:16 .profile
-rw-r--r-- 1 nirjala nirjala 10868 Dec 12 01:16 .zshrc

```

Figure 8: Output of ls -a -l

7. What's in a file? Type below commands.
cat /etc/passwd

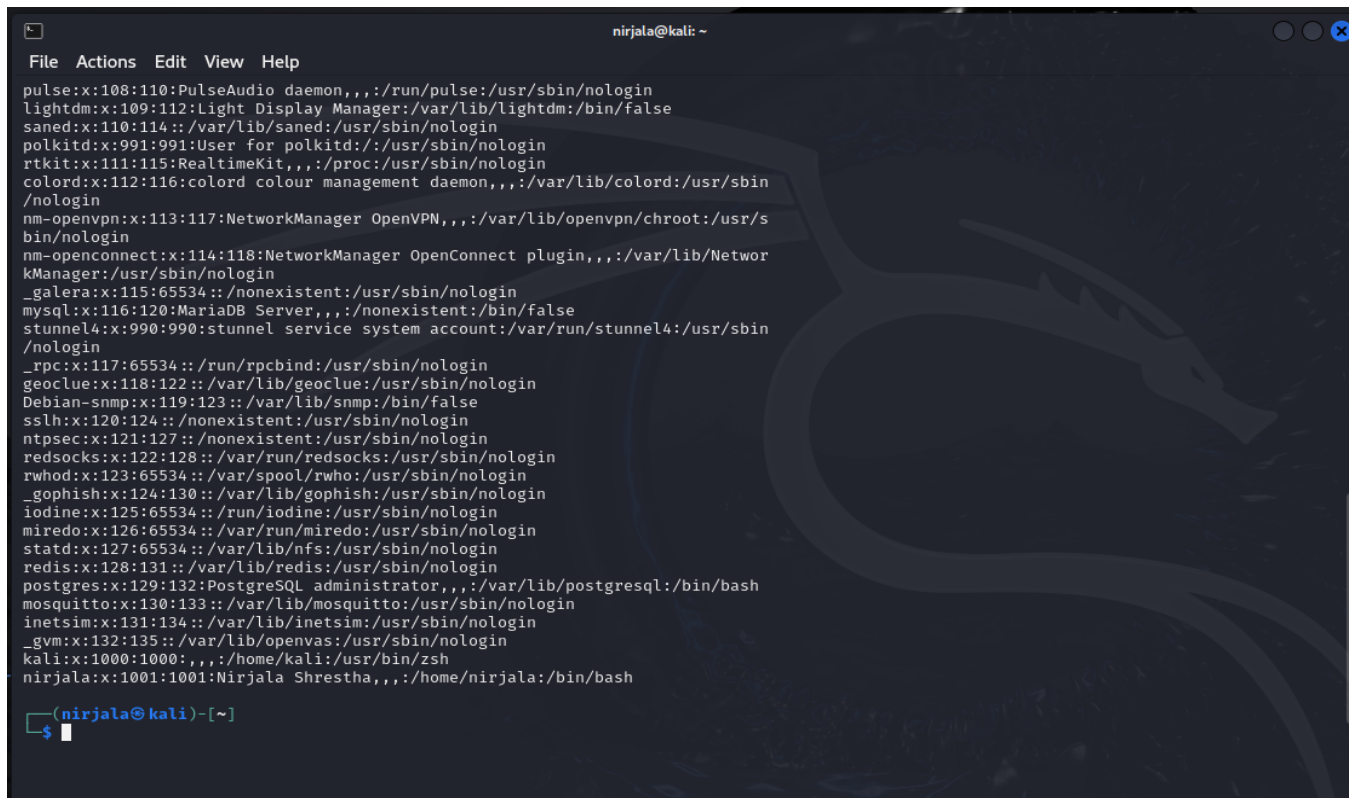
```

File Actions Edit View Help

(nirjala@kali)-[~]
$ cat /etc/passwd
root:x:0:0:root:/root:/usr/bin/zsh
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/usr/sbin/nologin
man:x:6:12:man:/var/cache/man:/usr/sbin/nologin
lp:x:7:7:lp:/var/spool/lpd:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/usr/sbin/nologin
news:x:9:9:news:/var/spool/news:/usr/sbin/nologin
uucp:x:10:10:uucp:/var/spool/uucp:/usr/sbin/nologin
proxy:x:13:13:proxy:/bin:/usr/sbin/nologin
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
backup:x:34:34:backup:/var/backups:/usr/sbin/nologin
list:x:38:38:Mailing List Manager:/var/list:/usr/sbin/nologin
irc:x:39:39:ircd:/run/ircd:/usr/sbin/nologin
_apt:x:42:65534::/nonexistent:/usr/sbin/nologin
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
systemd-network:x:998:998:systemd Network Management:/:/usr/sbin/nologin
systemd-timesync:x:992:992:systemd Time Synchronization:/:/usr/sbin/nologin
messagebus:x:100:102::/nonexistent:/usr/sbin/nologin
tss:x:101:104:TPM software stack,,,:/var/lib/tpm:/bin/false
strongswan:x:102:65534::/var/lib/strongswan:/usr/sbin/nologin
tcpdump:x:103:105::/nonexistent:/usr/sbin/nologin
sshd:x:104:65534::/run/sshd:/usr/sbin/nologin
usbmux:x:105:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
dnsmasq:x:999:65534:dnsmasq:/var/lib/misc:/usr/sbin/nologin
avahi:x:106:108:Avahi mDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
speech-dispatcher:x:107:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
pulse:x:108:110:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
lightdm:x:109:112:Light Display Manager:/var/lib/lightdm:/bin/false
saned:x:110:114::/var/lib/saned:/usr/sbin/nologin
polkitd:x:991:991:User for polkitd:/:/usr/sbin/nologin
rtkit:x:111:115:RealtimeKit,,,:/proc:/usr/sbin/nologin
colord:x:112:116:colord colour management daemon,,,:/var/lib/colord:/usr/sbin

```

Figure 9: Inserting cat /etc/passwd



```

nirjala@kali: ~
File Actions Edit View Help
pulse:x:108:110:PulseAudio daemon,,,:/run/pulse:/usr/sbin/nologin
lightdm:x:109:112:Light Display Manager:/var/lib/lightdm:/bin/false
saned:x:110:114::/var/lib/saned:/usr/sbin/nologin
polkitd:x:991:991:User for polkitd:/usr/sbin/nologin
rtkit:x:111:115:RealtimeKit,,,:/proc:/usr/sbin/nologin
colord:x:112:116:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
nm-openvpn:x:113:117:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
nm-openconnect:x:114:118:NetworkManager OpenConnect plugin,,,:/var/lib/NetworkManager:/usr/sbin/nologin
_galera:x:115:65534::/nonexistent:/usr/sbin/nologin
mysql:x:116:120:MariaDB Server,,,:/bin:/bin/false
stunnel4:x:990:990:stunnel service system account:/var/run/stunnel4:/usr/sbin/nologin
_rpc:x:117:65534::/run/rpcbind:/usr/sbin/nologin
geoclue:x:118:122:/var/lib/geoclue:/usr/sbin/nologin
Debian-snmpp:x:119:123:/var/lib/snmpp:/bin/false
sshd:x:120:124::/nonexistent:/usr/sbin/nologin
ntpd:x:121:127::/nonexistent:/usr/sbin/nologin
redsocks:x:122:128:/var/run/redsocks:/usr/sbin/nologin
rwhod:x:123:65534:/var/spool/rwho:/usr/sbin/nologin
_gophish:x:124:130:/var/lib/gophish:/usr/sbin/nologin
iodine:x:125:65534:/run/iodine:/usr/sbin/nologin
miredo:x:126:65534:/var/run/miredo:/usr/sbin/nologin
statd:x:127:65534:/var/lib/nfs:/usr/sbin/nologin
redis:x:128:131:/var/lib/redis:/usr/sbin/nologin
postgres:x:129:132:PostgreSQL administrator,,,:/var/lib/postgresql:/bin/bash
mosquitto:x:130:133:/var/lib/mosquitto:/usr/sbin/nologin
inetsim:x:131:134:/var/lib/inetsim:/usr/sbin/nologin
_gvm:x:132:135:/var/lib/openvas:/usr/sbin/nologin
kali:x:1000:1000,,,:/home/kali:/usr/bin/zsh
nirjala:x:1001:1001:Nirjala Shrestha,,,:/home/nirjala:/bin/bash

(nirjala@kali)-[~]
$

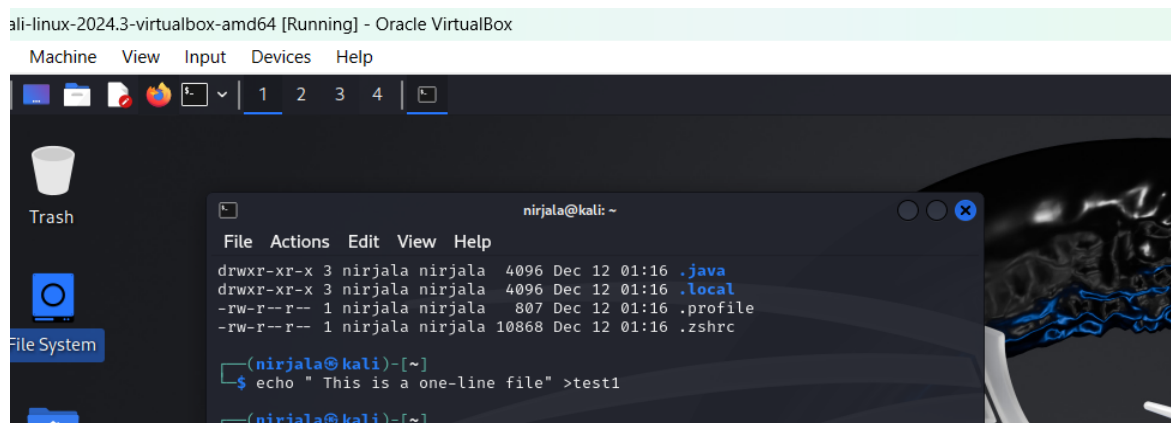
```

Figure 10: Inserting cat/ etc/passwd

8. Create a file named test1 by typing this:

echo "This is a one-line file" > test1

- Generating a file named test1 that includes "This is a one-line file"



```

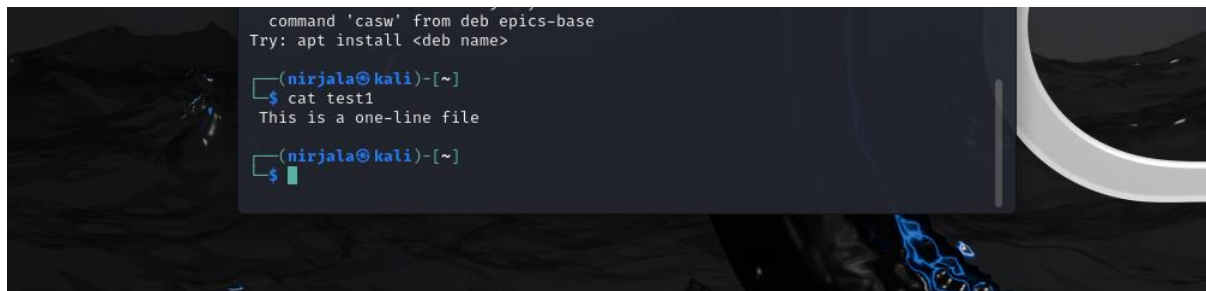
ali-linux-2024.3-virtualbox-amd64 [Running] - Oracle VirtualBox
Machine View Input Devices Help
1 2 3 4
Trash
File System
drwxr-xr-x 3 nirjala nirjala 4096 Dec 12 01:16 .java
drwxr-xr-x 3 nirjala nirjala 4096 Dec 12 01:16 .local
-rw-r--r-- 1 nirjala nirjala 807 Dec 12 01:16 .profile
-rw-r--r-- 1 nirjala nirjala 10868 Dec 12 01:16 .zshrc

(nirjala@kali)-[~]
$ echo " This is a one-line file" >test1

(nirjala@kali)-[~]

```

Figure 11: Creating a file named test1

A terminal window with a dark background and a light blue cursor. The prompt is (nirjala@kali)-[~]. The command cat test1 has been entered, and the output is 'This is a one-line file'.

```
command 'casw' from deb epics-base
Try: apt install <deb name>

(nirjala@kali)-[~]
$ cat test1
This is a one-line file

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

Figure 12: Output of test 1

9. Create another file by typing the following; where ^D means CTRL-D.

cat > test2

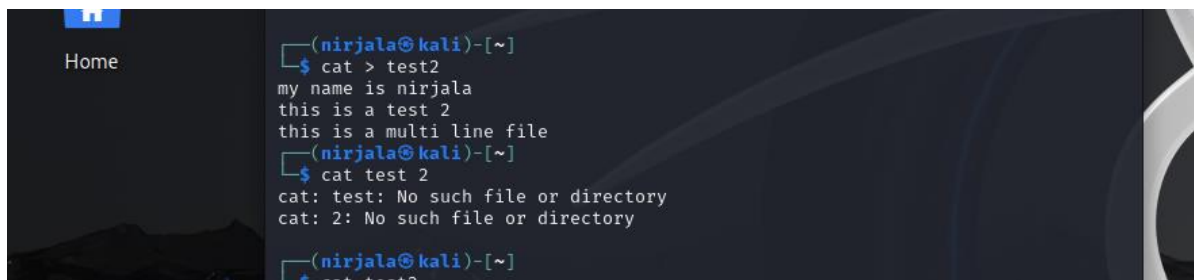
This is file two.

It has several lines.

Three lines, in fact.

^D

- Generating another file named test2 with providing some information.

A terminal window showing the creation of a file. The prompt is (nirjala@kali)-[~]. The command cat > test2 is entered. Then, three lines of text are entered: 'my name is nirjala', 'this is a test 2', and 'this is a multi line file'. After pressing CTRL-D, the prompt returns. Then, the command cat test 2 is entered, resulting in an error: 'cat: test: No such file or directory'. Finally, the command cat: 2: No such file or directory is entered, resulting in another error: 'cat: 2: No such file or directory'.

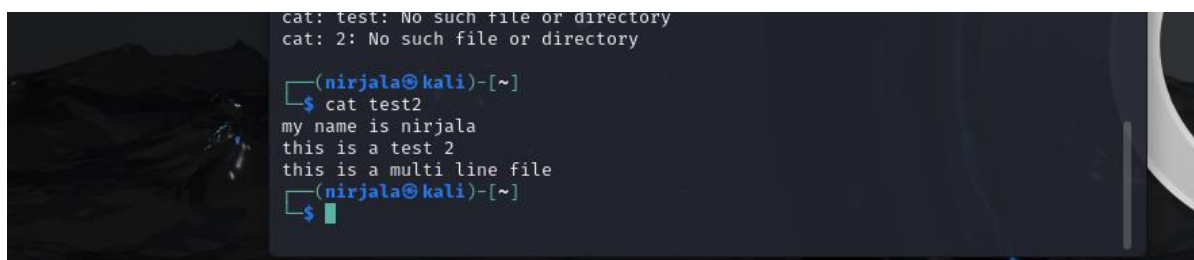
```
(nirjala@kali)-[~]
$ cat > test2
my name is nirjala
this is a test 2
this is a multi line file
(nirjala@kali)-[~]
$ cat test 2
cat: test: No such file or directory
cat: 2: No such file or directory

(nirjala@kali)-[~]
$ cat test2
```

Figure 13: Creating file test 2

10. Show that the file exists, and what it contains.

- Output of the test2 .

A terminal window showing the output of the cat test2 command. The prompt is (nirjala@kali)-[~]. The command cat test2 is entered, and the output is 'my name is nirjala', 'this is a test 2', and 'this is a multi line file'.

```
cat: test: No such file or directory
cat: 2: No such file or directory

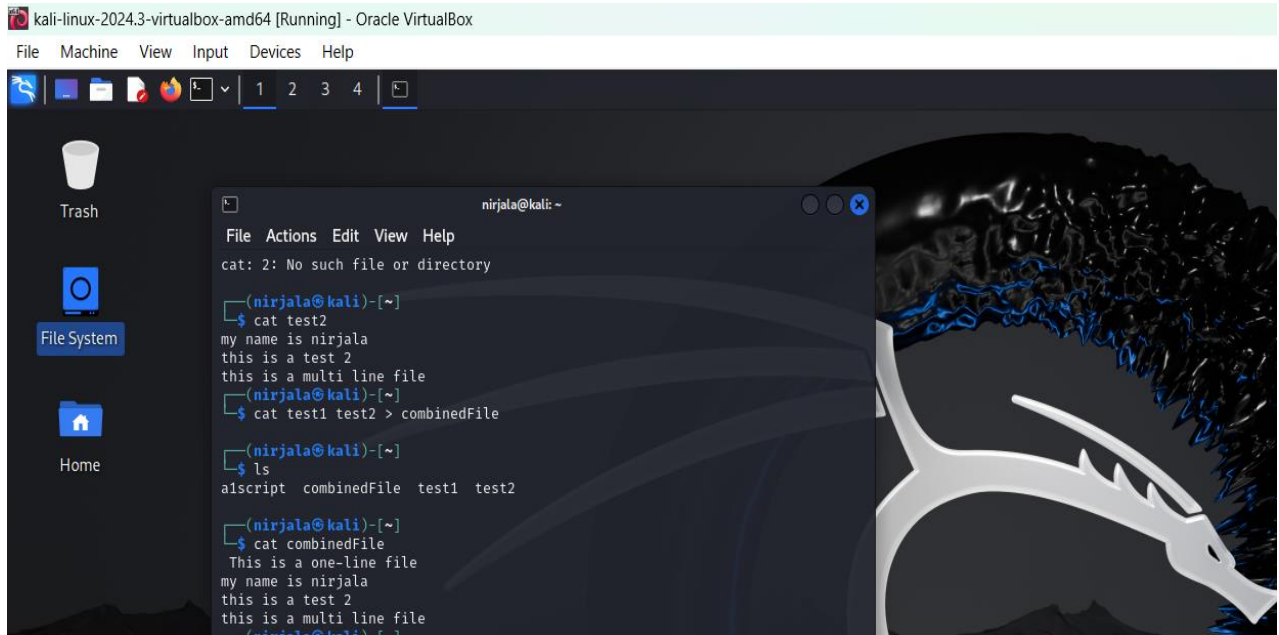
(nirjala@kali)-[~]
$ cat test2
my name is nirjala
this is a test 2
this is a multi line file

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

Figure 14: Output of test 2

11. Combine test1 and test2 file.

- Combining both test1 and test2 to see the result.



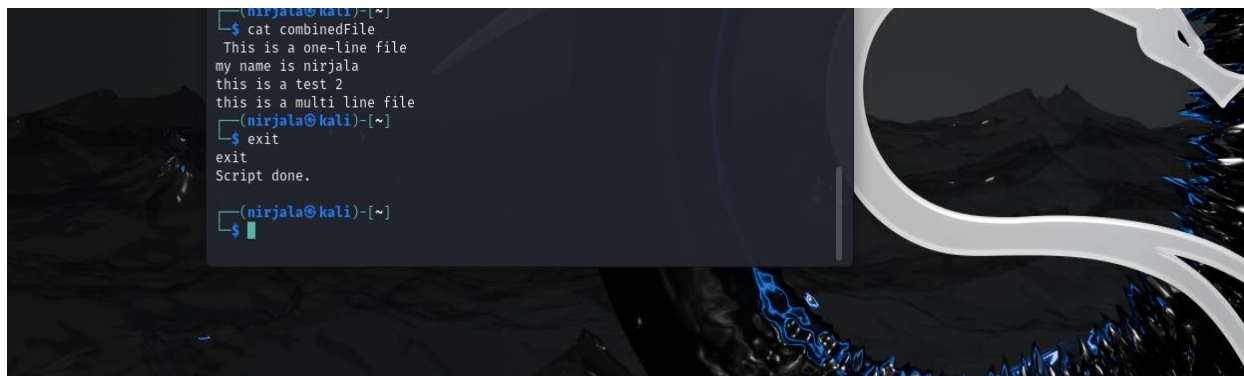
The screenshot shows a terminal window titled 'nirjala@kali: ~'. The user has executed the following commands:

```
nirjala@kali: ~  
$ cat test2  
my name is nirjala  
this is a test 2  
this is a multi line file  
$ cat test1 test2 > combinedFile  
$ ls  
alscript combinedFile test1 test2  
$ cat combinedFile  
This is a one-line file  
my name is nirjala  
this is a test 2  
this is a multi line file
```

Figure 15: Combining test1 and test2

12. Exit the script

- Exiting the script.



The screenshot shows the terminal window after the user has entered the 'exit' command. The output is:

```
nirjala@kali: ~  
$ cat combinedFile  
This is a one-line file  
my name is nirjala  
this is a test 2  
this is a multi line file  
$ exit  
exit  
Script done.  
$
```

Figure 16: Exiting the script

3. References

Lee Allen, T. H. (Apr 7, 2014). *Kali Linux – Assuring Security by Penetration Testing*.
UK: Lee Allen, Tedi Heriyanto, Shakeel Ali.

4. Conclusion

Kali Linux is a secure and flexible operating system which is developed just for security researchers, legal hackers, security professionals. Kali Linux is an excellent option for training and performing cyber security since it is easily accessible and free project. Despite this, modern technology needs to be carried out constantly wisely and properly for legal and moral values. In conclusion, Kali Linux is an effective operating system that allows users to properly secure as well as learn advanced computer system.