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Introduction

Linux system was firstly started as personal project for Linus Torvalds a computer science student at University of Helsinki, looking back to it's root guide us to Unix system. Unix was developed in 1970's by Ken Thompson at AT&T Labs and with other commercial vendors. Unix is one of the poineer in operating system market leading to Linux system. Linus was inspired by Minix and started using it as a references to create base for his operating system's licensing, design, and other aspect. Both Unix and Linux have shaped the foundation for modern computing, powering personal computers to the majority of web servers. Linux operating system has been used for its flexibility, scalability, and the ability to work across various hardware architectures from different manufacturers.

Minix was developed as clone of Unix operating system by computer scientist Andrew S Tanenbaum in 1987 for low end affordable processors. Initially Minix was proprietary source available software and later in 2000 it was relicensed was open source to public. In 1991, Linus Torvalds began developing the Linux kernel for testing capabilities of his PC resources. Initially created on the MINIX operating system using the GNU C Compiler, Linux was designed to be modular and efficient.

Torvalds drew inspiration from Unix system calls, learning from SunOS documentation and resources available at the time. Linux quickly gained popularity due to its open-source nature, allowing developers worldwide to contribute, modify, and distribute the software freely (Understanding Linux, 2023)

The Linux command line is a text interface to your computer. (Canonical Ltd, 2024) Linux now a days is widely used kernel for controlling various hardware, almost majority of the space tech program and most cloud service use linux kernel. Being open source code any individual can contribute for fixing codes.

Objective

This log is about understanding the commands in Linux based operating system. Using linux based operating system in Command Line Interface (CLI) , various commands are used for :

- Start and record process script session
- Retrive user information
- Retrive system information
- Explore and manage files and directory
- Create and manage files inside CLI

Required Tools and Concepts

Hardware:

- X86 or 64bit processor
- 4GB RAM recommended
- 20GB of disk space minimum

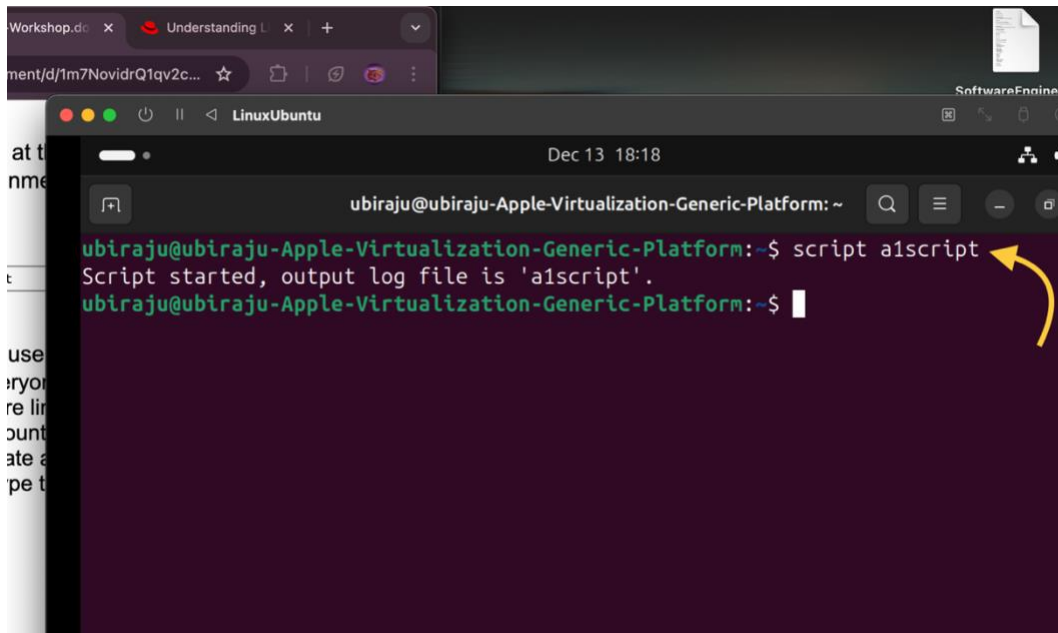
Software:

- Linux based Operating system ISO file
- Hypervisor for Virtual machine (if needed)
- Windows or any other operating system (if running on virtual machine)

Concepts:

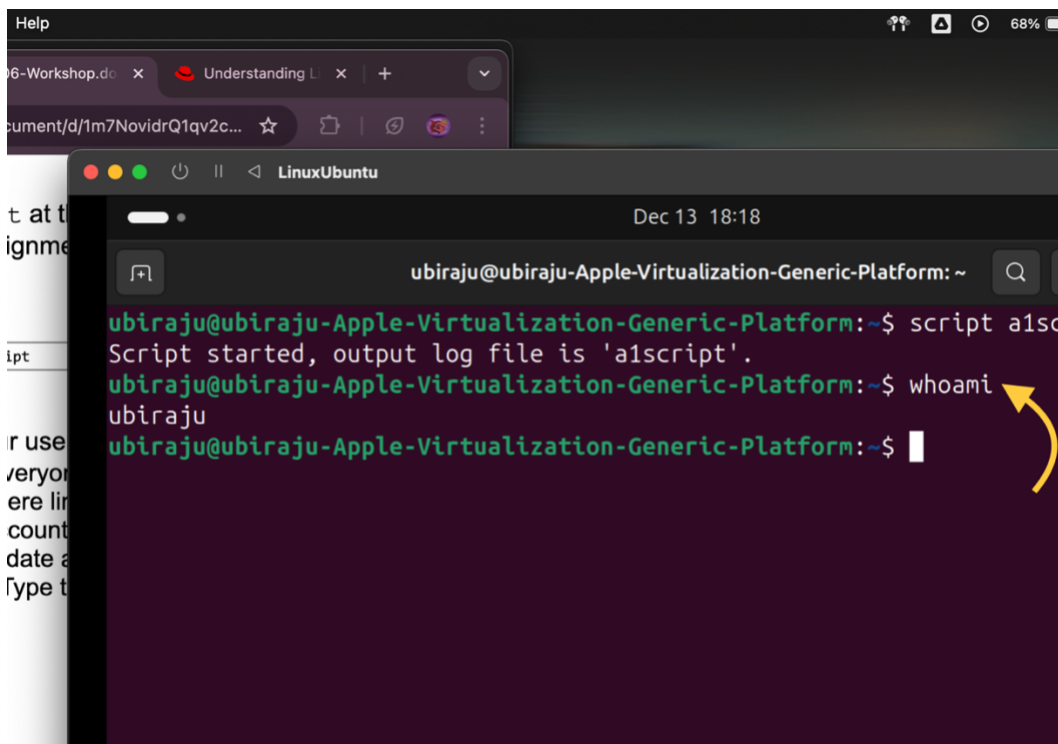
- Command Line Interface (CLI):
CLI provides user a interface to interact with various functions and methods of system using commands
- Linux/Unix/Minix:
They are kernel to manage hardware resources and processes for OS.
- File and Directory Management:
Use of commands like ls, ls -a to move between directory and creating files.
- Scripting:
Use of script command to record terminal sessions as log

Steps to replicate:



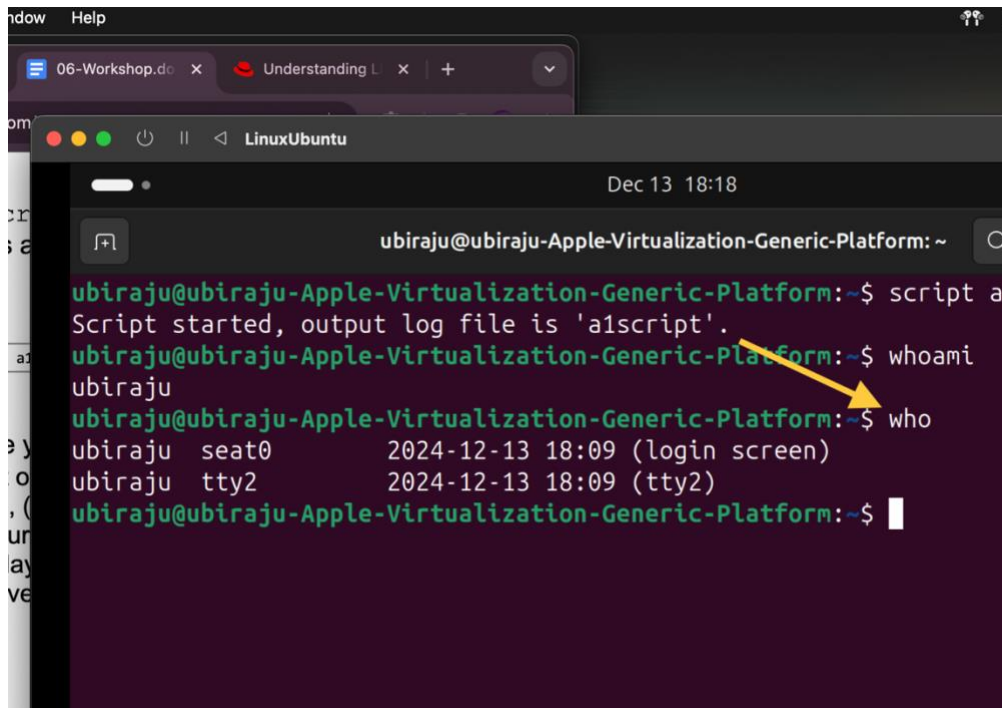
A screenshot of a Linux terminal window titled "LinuxUbuntu" with the date and time "Dec 13 18:18". The prompt is "ubiraju@ubiraju-Apple-Virtualization-Generic-Platform: ~". The user has entered the command "script a1script". The terminal output shows "Script started, output log file is 'a1script'." followed by a new prompt "ubiraju@ubiraju-Apple-Virtualization-Generic-Platform: ~\$". A yellow arrow points to the command "script a1script".

Figure 1: Open terminal and type command
"script a1script" starts recording the session output log file



A screenshot of the same Linux terminal window. The prompt is "ubiraju@ubiraju-Apple-Virtualization-Generic-Platform: ~". The user has entered the command "whoami". The terminal output shows "ubiraju" followed by a new prompt "ubiraju@ubiraju-Apple-Virtualization-Generic-Platform: ~\$". A yellow arrow points to the command "whoami".

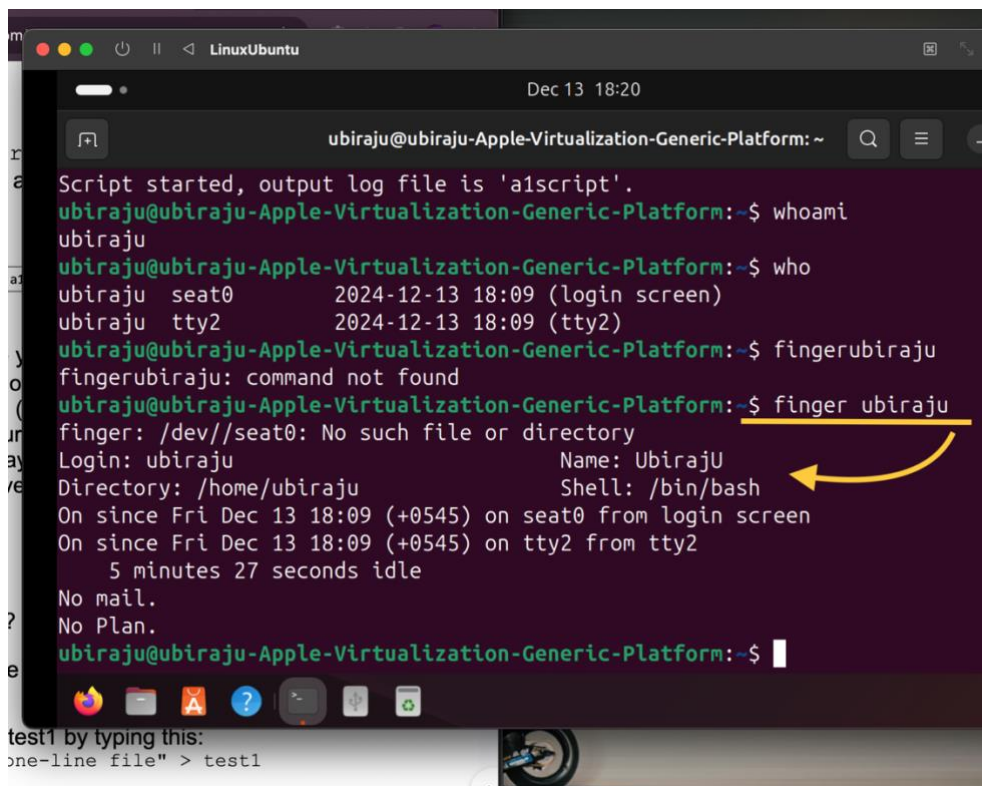
Figure 2: get to know the user
type command "whoami"
reports you with current user account that has been logged in



A terminal window titled "LinuxUbuntu" with a search bar and a magnifying glass icon. The prompt is "ubiraju@ubiraju-Apple-Virtualization-Generic-Platform: ~". The user has entered "script a" and "Script started, output log file is 'a1script'.". Then they entered "whoami" and "ubiraju". Then they entered "who" and the output is shown. A yellow arrow points from the "who" command to the output.

```
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ script a
Script started, output log file is 'a1script'.
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ whoami
ubiraju
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ who
ubiraju  seat0      2024-12-13 18:09 (login screen)
ubiraju  tty2        2024-12-13 18:09 (tty2)
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
```

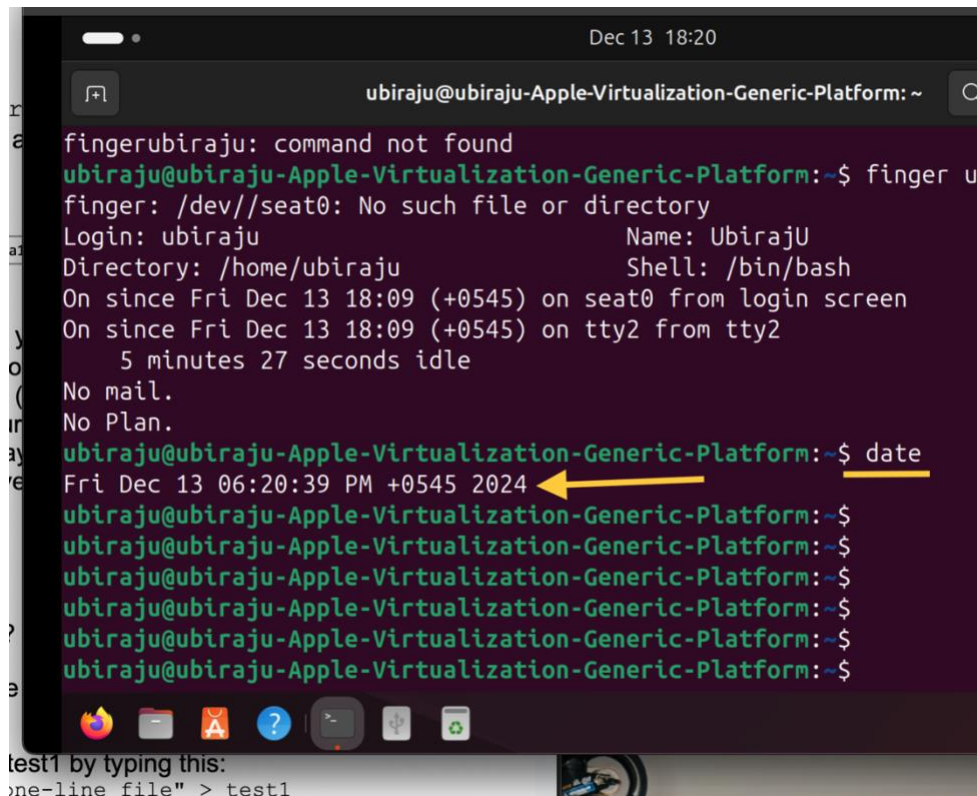
Figure 3: command "who" outputs all the logged users in the system



A terminal window titled "LinuxUbuntu" with a search bar and a magnifying glass icon. The prompt is "ubiraju@ubiraju-Apple-Virtualization-Generic-Platform: ~". The user has entered "Script started, output log file is 'a1script'.". Then they entered "whoami" and "ubiraju". Then they entered "who" and the output is shown. Then they entered "fingerubiraju" and "fingerubiraju: command not found". Then they entered "finger ubiraju" and the output is shown. A yellow arrow points from the "finger ubiraju" command to the output.

```
Script started, output log file is 'a1script'.
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ whoami
ubiraju
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ who
ubiraju  seat0      2024-12-13 18:09 (login screen)
ubiraju  tty2        2024-12-13 18:09 (tty2)
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ fingerubiraju
fingerubiraju: command not found
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ finger ubiraju
finger: /dev//seat0: No such file or directory
Login: ubiraju                      Name: UbirajU
Directory: /home/ubiraju           Shell: /bin/bash
On since Fri Dec 13 18:09 (+0545) on seat0 from login screen
On since Fri Dec 13 18:09 (+0545) on tty2 from tty2
      5 minutes 27 seconds idle
No mail.
No Plan.
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
```

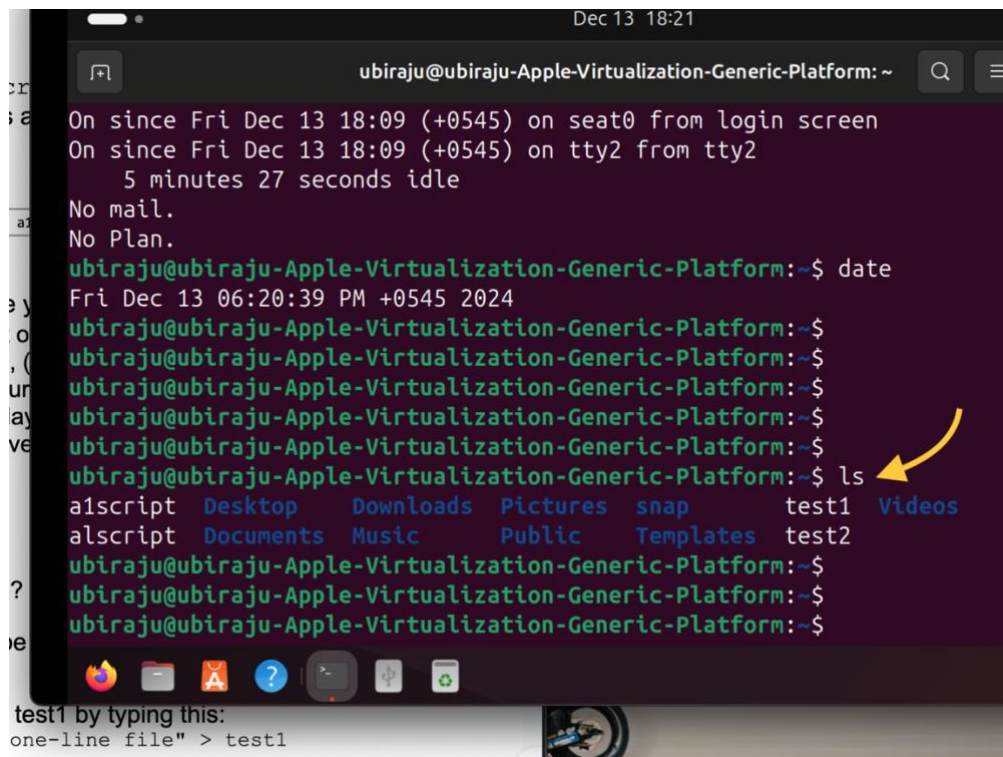
Figure 4: command "finger *username*" displays account details and other login information



A terminal window titled "ubiraju@ubiraju-Apple-Virtualization-Generic-Platform: ~" with a search icon on the right. The window shows the output of the 'finger' command, which displays user information for 'ubiraju'. Below this, the 'date' command is executed, showing the current date and time. A yellow arrow points to the output of the 'date' command. At the bottom of the terminal, there is a prompt "test1 by typing this:" followed by "one-line file" > test1". The macOS dock is visible at the bottom of the terminal window.

```
Dec 13 18:20
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform: ~
fingerubiraju: command not found
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ finger u
finger: /dev//seat0: No such file or directory
Login: ubiraju                      Name: UbirajU
Directory: /home/ubiraju            Shell: /bin/bash
On since Fri Dec 13 18:09 (+0545) on seat0 from login screen
On since Fri Dec 13 18:09 (+0545) on tty2 from tty2
      5 minutes 27 seconds idle
No mail.
No Plan.
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ date
Fri Dec 13 06:20:39 PM +0545 2024
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
test1 by typing this:
one-line file" > test1
```

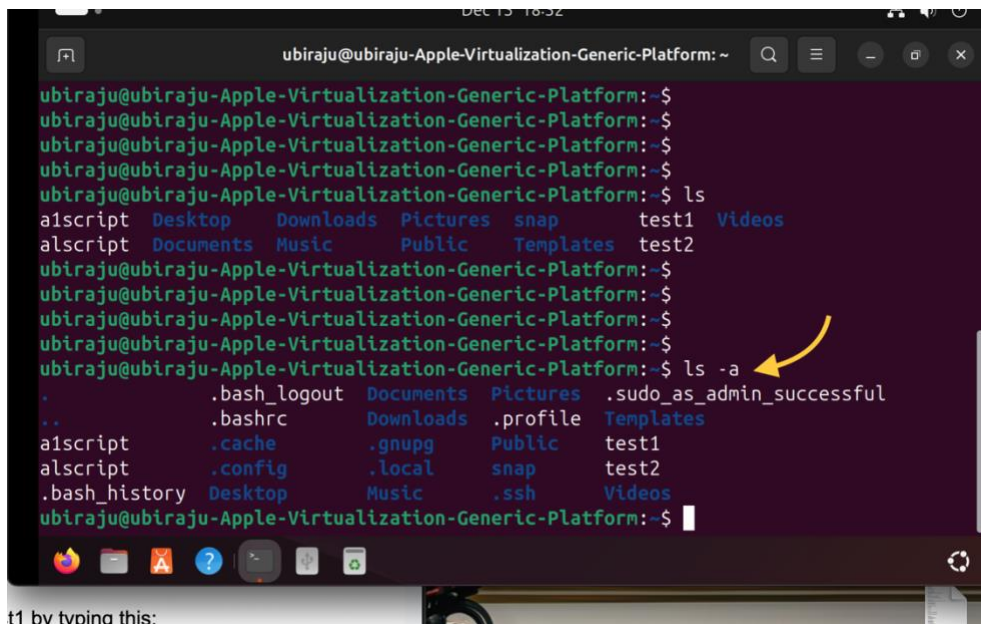
Figure 5: command "date" outputs current date and time



A terminal window titled "ubiraju@ubiraju-Apple-Virtualization-Generic-Platform: ~" with search and menu icons on the right. The window shows the output of the 'ls' command, which displays a list of files and directories in the user's home directory. A yellow arrow points to the output of the 'ls' command. At the bottom of the terminal, there is a prompt "test1 by typing this:" followed by "one-line file" > test1". The macOS dock is visible at the bottom of the terminal window.

```
Dec 13 18:21
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform: ~
On since Fri Dec 13 18:09 (+0545) on seat0 from login screen
On since Fri Dec 13 18:09 (+0545) on tty2 from tty2
      5 minutes 27 seconds idle
No mail.
No Plan.
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ date
Fri Dec 13 06:20:39 PM +0545 2024
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ ls
alscript Desktop Downloads Pictures snap test1 Videos
alscript Documents Music Public Templates test2
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
test1 by typing this:
one-line file" > test1
```

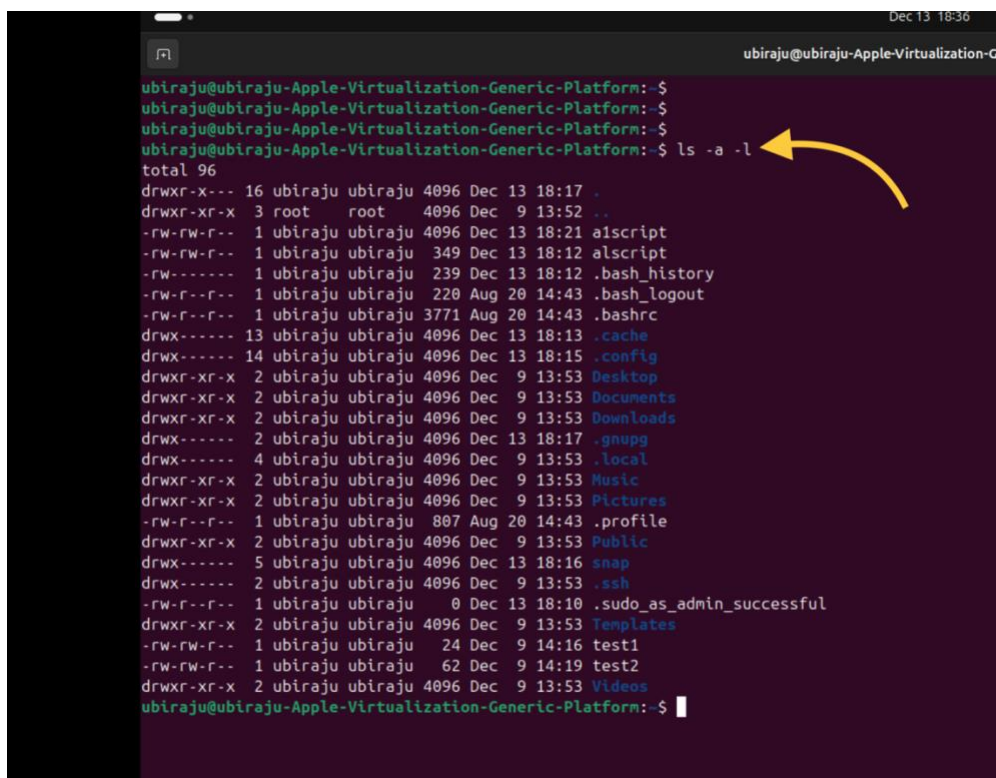
Figure 6: command "ls" displays list of files in user's home directory



```
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform: ~  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ ls  
alscript Desktop Downloads Pictures snap test1 Videos  
alscript Documents Music Public Templates test2  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ ls -a  
.. .bash_logout Documents Pictures .sudo_as_admin_successful  
.. .bashrc Downloads .profile Templates  
alscript .cache .gnupg Public test1  
alscript .config .local snap test2  
.bash_history Desktop Music .ssh Videos  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
```

t1 by typing this:

Figure 7: command "ls -a" displays all directory including hidden files



```
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ ls -a -l  
total 96  
drwxr-xr-x 16 ubiraju ubiraju 4096 Dec 13 18:17 .  
drwxr-xr-x  3 root    root    4096 Dec  9 13:52 ..  
-rw-rw-r--  1 ubiraju ubiraju 4096 Dec 13 18:21 alscript  
-rw-rw-r--  1 ubiraju ubiraju 349  Dec 13 18:12 alscript  
-rw-----  1 ubiraju ubiraju 239  Dec 13 18:12 .bash_history  
-rw-r--r--  1 ubiraju ubiraju 220  Aug 20 14:43 .bash_logout  
-rw-r--r--  1 ubiraju ubiraju 3771 Aug 20 14:43 .bashrc  
drwx----- 13 ubiraju ubiraju 4096 Dec 13 18:13 .cache  
drwx----- 14 ubiraju ubiraju 4096 Dec 13 18:15 .config  
drwxr-xr-x  2 ubiraju ubiraju 4096 Dec  9 13:53 Desktop  
drwxr-xr-x  2 ubiraju ubiraju 4096 Dec  9 13:53 Documents  
drwxr-xr-x  2 ubiraju ubiraju 4096 Dec  9 13:53 Downloads  
drwx-----  2 ubiraju ubiraju 4096 Dec 13 18:17 .gnupg  
drwx-----  4 ubiraju ubiraju 4096 Dec  9 13:53 .local  
drwxr-xr-x  2 ubiraju ubiraju 4096 Dec  9 13:53 Music  
drwxr-xr-x  2 ubiraju ubiraju 4096 Dec  9 13:53 Pictures  
-rw-r--r--  1 ubiraju ubiraju 807  Aug 20 14:43 .profile  
drwxr-xr-x  2 ubiraju ubiraju 4096 Dec  9 13:53 Public  
drwx-----  5 ubiraju ubiraju 4096 Dec 13 18:16 snap  
drwx-----  2 ubiraju ubiraju 4096 Dec  9 13:53 .ssh  
-rw-r--r--  1 ubiraju ubiraju   0 Dec 13 18:10 .sudo_as_admin_successful  
drwxr-xr-x  2 ubiraju ubiraju 4096 Dec  9 13:53 Templates  
-rw-rw-r--  1 ubiraju ubiraju 24   Dec  9 14:16 test1  
-rw-rw-r--  1 ubiraju ubiraju 62   Dec  9 14:19 test2  
drwxr-xr-x  2 ubiraju ubiraju 4096 Dec  9 13:53 Videos  
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
```

Figure 8: displays all the files long list with their directory, size, date created and other information.


```
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform: ~
On since Fri Dec 13 18:37 (+0545) on tty2 from tty2
3 minutes 29 seconds idle
No mail.
No Plan.
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
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:996:996:systemd Time Synchronization:/usr/sbin/nologin
dhcpcd:x:100:65534:DHCP Client Daemon,,,:/usr/lib/dhcpcd:/bin/false
messagebus:x:101:101::/nonexistent:/usr/sbin/nologin
syslog:x:102:102::/nonexistent:/usr/sbin/nologin
systemd-resolve:x:991:991:systemd Resolver:/usr/sbin/nologin
usbmux:x:103:46:usbmux daemon,,,:/var/lib/usbmux:/usr/sbin/nologin
tss:x:104:104:TPM software stack,,,:/var/lib/tpm:/bin/false
uuidd:x:105:106:/run/uuidd:/usr/sbin/nologin
systemd-oom:x:990:990:systemd Userspace OOM Killer:/usr/sbin/nologin
whoopsie:x:106:109::/nonexistent:/bin/false
```

Figure 9: command "cat etc/passwd" displays all information for all user account in a plain text file

```
avahi:x:107:111:Avahi MDNS daemon,,,:/run/avahi-daemon:/usr/sbin/nologin
tcpdump:x:108:112::/nonexistent:/usr/sbin/nologin
sssd:x:109:113:SSSD system user,,,:/var/lib/sss:/usr/sbin/nologin
speech-dispatcher:x:110:29:Speech Dispatcher,,,:/run/speech-dispatcher:/bin/false
cups-pk-helper:x:111:114:user for cups-pk-helper service,,,:/nonexistent:/usr/sbin/nologin
fwupd-refresh:x:989:989:Firmware update daemon:/var/lib/fwupd:/usr/sbin/nologin
saned:x:112:116::/var/lib/saned:/usr/sbin/nologin
geoclue:x:113:117::/var/lib/geoclue:/usr/sbin/nologin
cups-browsed:x:114:114::/nonexistent:/usr/sbin/nologin
hplip:x:115:7:HPLIP system user,,,:/run/hplip:/bin/false
gnome-remote-desktop:x:988:988:GNOME Remote Desktop:/var/lib/gnome-remote-desktop:/usr/sbin/nologin
polkitd:x:987:987:User for polkitd:/usr/sbin/nologin
rtkit:x:116:119:RealtimeKit,,,:/proc:/usr/sbin/nologin
colord:x:117:120:colord colour management daemon,,,:/var/lib/colord:/usr/sbin/nologin
gnome-initial-setup:x:118:65534:/run/gnome-initial-setup:/bin/false
nm-openvpn:x:119:121:NetworkManager OpenVPN,,,:/var/lib/openvpn/chroot:/usr/sbin/nologin
gdm:x:120:122:Gnome Display Manager:/var/lib/gdm3:/bin/false
ubiraju:x:1000:1000:Ubiraju:/home/ubiraju:/bin/bash
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$ echo "This is one-line file" > test1
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
ubiraju@ubiraju-Apple-Virtualization-Generic-Platform:~$
```

Figure 10: command "echo "this is one-line file" > test1" where echo prints the text and save to file test1.txt

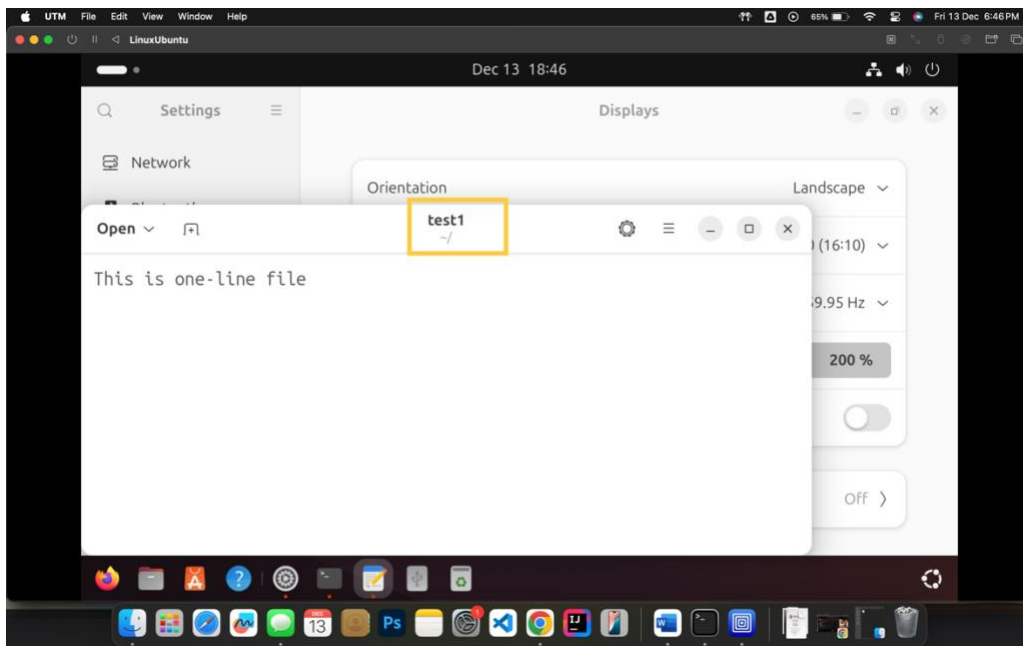


Figure 12: checking file test1 and its content

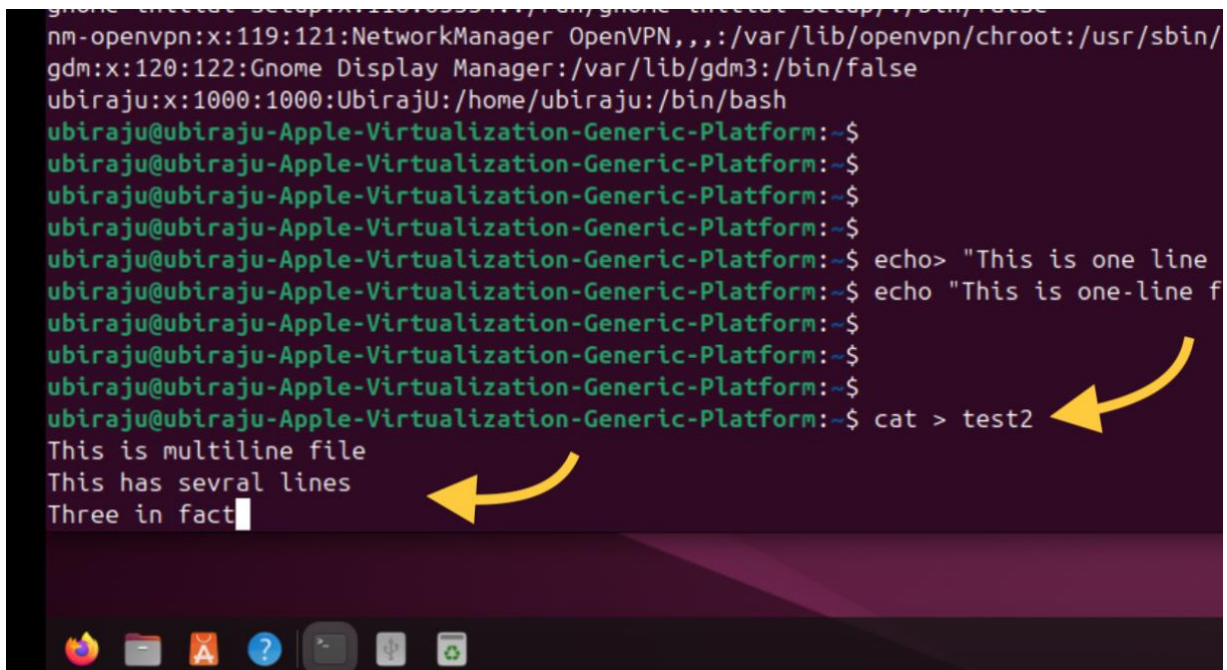


Figure 11: creating file test2 with multiline text

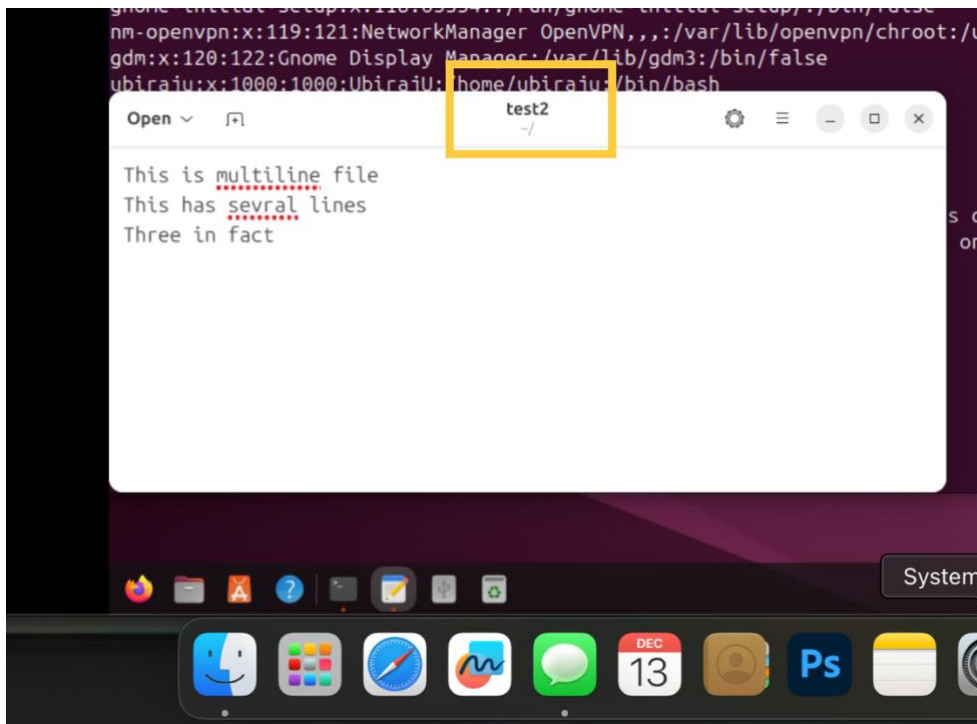


Figure 13: checking file test2.txt and its content

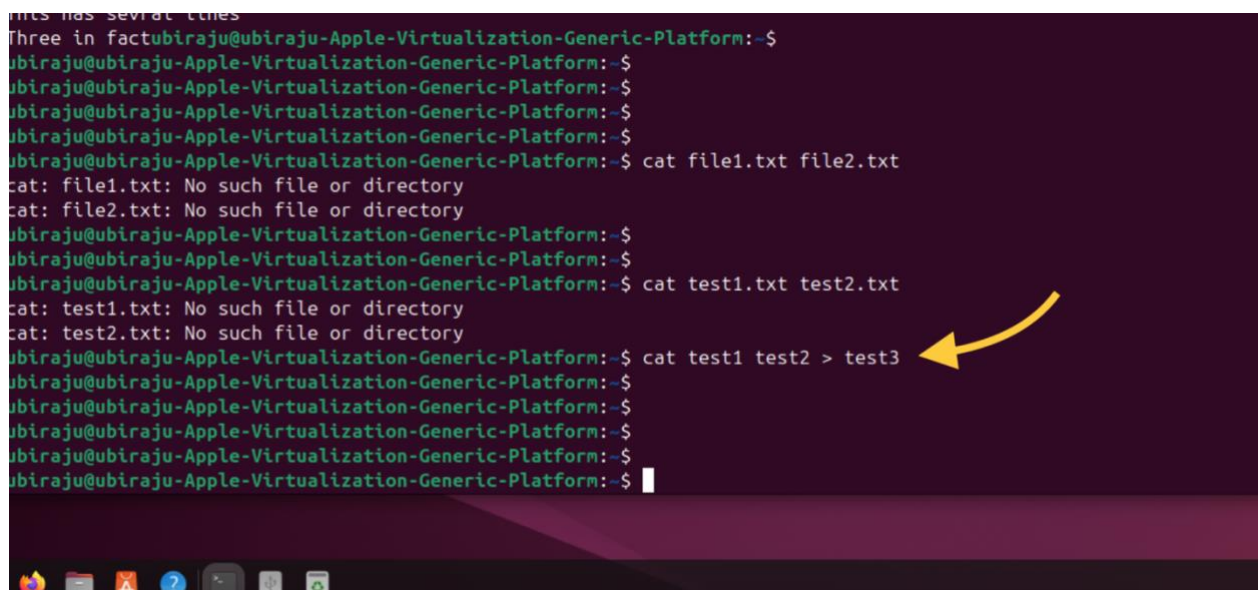


Figure 14: command "cat test1 test2 > test3" concatinates file test1 and test2 contents into file test3

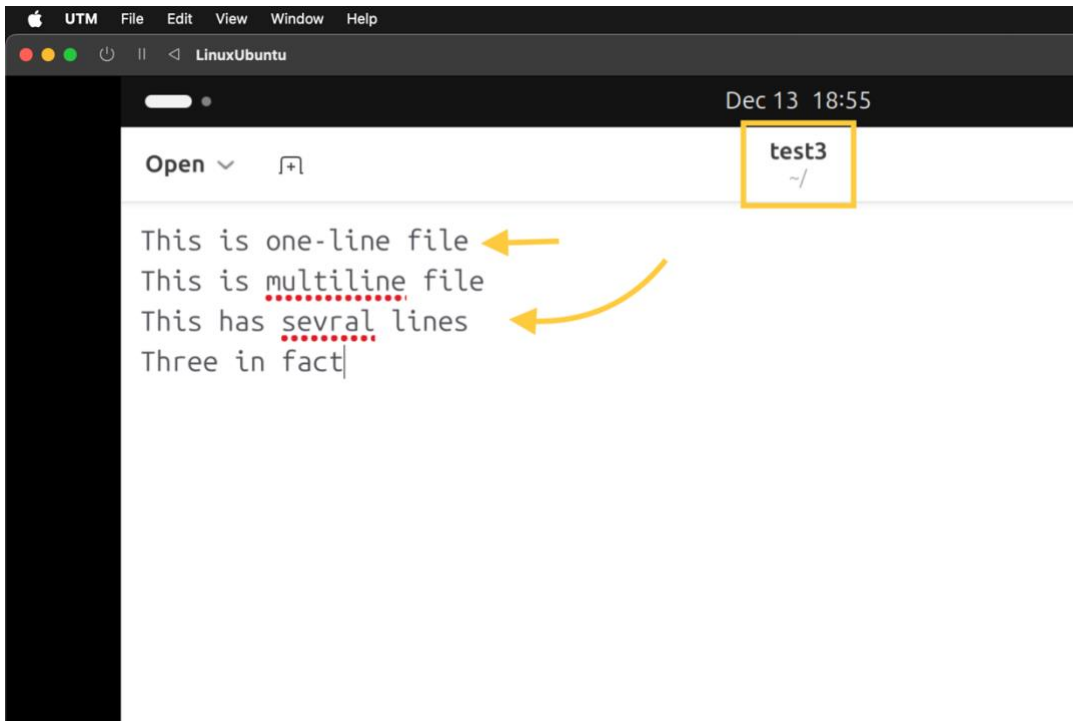


Figure 15: checking file test3.txt and its content

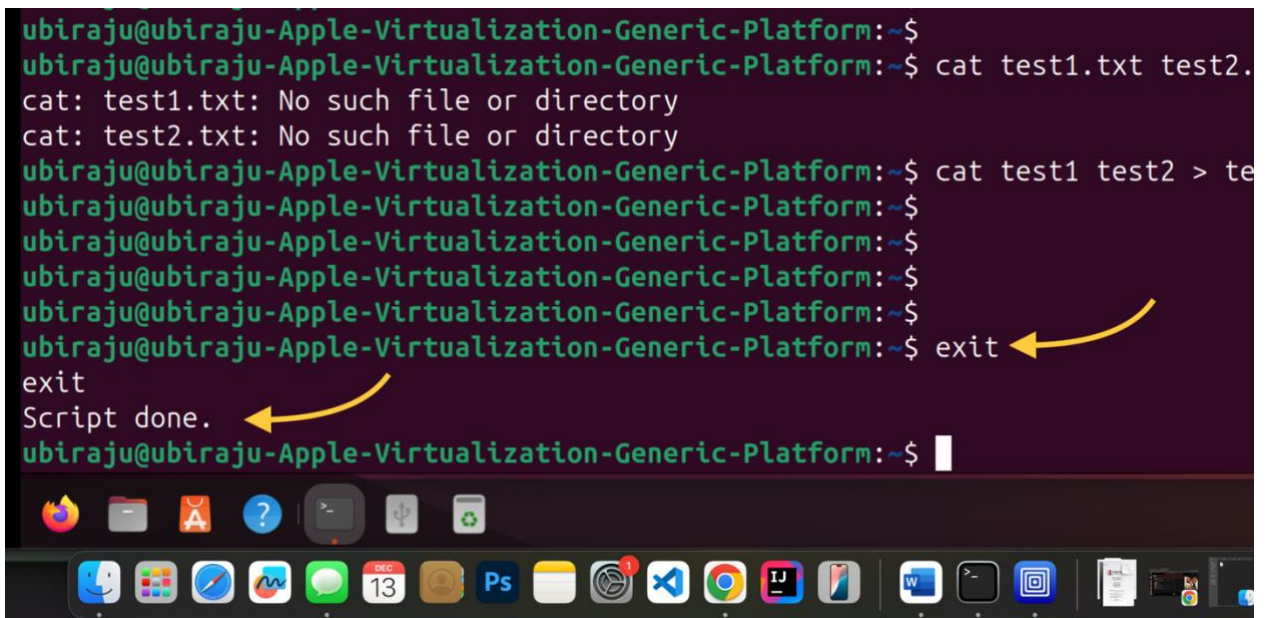


Figure 16: exiting the script log

Conclusion

In this lab class, we installed Linux based operating system, creating virtual machine in our personal computer and explored essential Linux commands such as “ls”, “whoami”, etc for retrieving user information, managing files, and creating text documents. Using the script command, the entire session was recorded. This log report provide few of fundamental skills for navigating and interacting with the Linux system thorough the use of command line interface, which is a critical tool for system administration, development, and troubleshooting.

References

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LinuxHandBook

<https://linuxhandbook.com/merge-files/>