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I confirm that I understand my coursework needs to be submitted online via Google Classroom under the relevant module page before the deadline for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a mark of zero will be awarded

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1. Introduction

In this log, delving deeper into UNIX commands and utilities, emphasizing text processing, alias management, and history manipulation. Using commands like:

- mkdir: Creates new directories.
- cd: Changes the current directory.
- cat: Concatenates and displays file content.
- grep: Search for patterns within files.
- alias: Creates shortcuts for longer commands.
- unalias: Removes previously defined aliases.
- history: Displays the list of previously executed commands.
- fc: Lists, edits, and re-executes commands from the history.
- rm: Removes files or directories.

By using these commands, the log provides hands-on experience in managing files, working with text data, and optimizing the command-line environment in UNIX. Through these tasks, users gain proficiency in navigating the file system, handling data, and managing their environment, which are all vital skills for effective system administration and day-to-day usage of UNIX-based systems.

(die.net, n.d.) (GNU, n.d.) (bash aliases, 2020) (GNU, n.d.) (die.net, n.d.) (unix, 2022)

2. Objective

To explore advance UNIX utilities and commands, such as:

- Mastering Text Processing with grep:
- Creating and Managing Aliases for Efficiency:
- Leveraging Command History for Workflow Optimization:
- Improving File and Directory Management Skills.
- Understanding System Administration Tools.
- Improving Overall Command-Line Efficiency and Productivity:

3. Required Tools and Concepts

a. Hardware/Software

- Virtualization Software
- UNIX-based operating system
- A terminal Emulator
- Text Editor
- Unix Shell
- nmap
- getent
- wc

b. Key Concepts

- File System Structure
    - Directories and Files
    - File Permissions
- Regular Expressions
    - Pattern Matching with grep
    - Common regular expressions
- Shell Commands and Utilities
    - Basic UNIX Commands
    - Using grep for Searching and Filtering
    - History and Command Re-execution
    - Alias Management
- Networking Concepts
    - IP Configuration
    - Subnetting
- System Administration Skills
    - User Management
    - System Monitoring and Management

4. Tasks and Steps

i. Create the Directory Structure

Commands Used:

```
mkdir -p lab8/{8cat-grep,other}
```

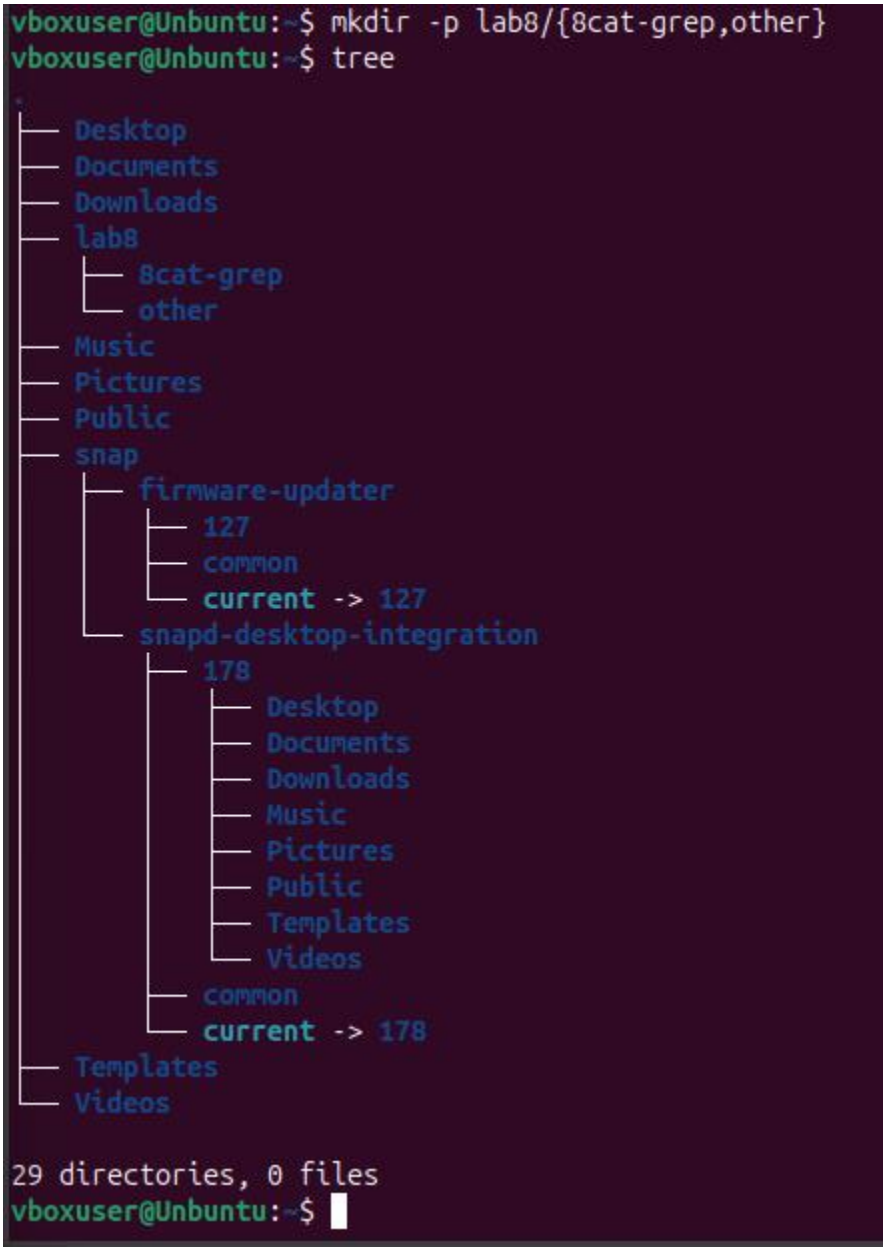

Figure 1: creating directory

ii. Navigate to the 8cat-grep Directory

Commands Used:

cd lab8/8cat-grep

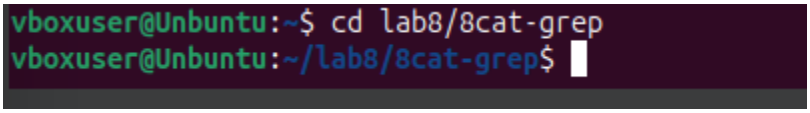

Figure 2: Navigation to 8cat-grep directory

iii. Create two files Using cat

Commands Used:

cat > testa << EOF

kkkll

lllm

oo--oo

dddkk

EOF

cat > testb << EOF

KKKKK

LLLLL

MMMMM

DDDDD

EOF

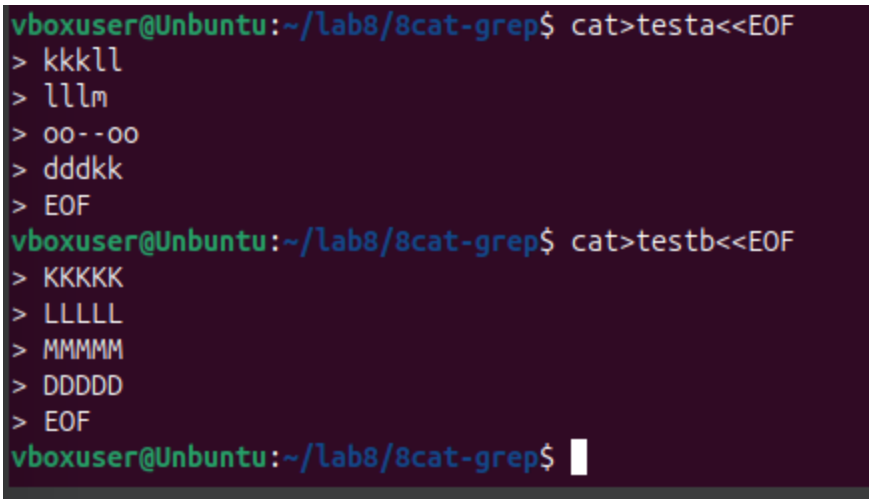

Figure 3: using cat to create files

iv. Execute the explore grep Commands

Commands Used:

grep ll testa

grep -v ll testa

grep -n ll testa

*grep -l ll **

*grep -i ll **

*grep -c ll **

grep '^K' testa testb

grep -n '^' testa

Explanation:

- grep ll testa: Finds lines containing ll in testa.
- grep -v ll testa: Excludes lines with ll.
- grep -n ll testa: Display line numbers with matches.
- grep -l ll *: Lists files containing matches.
- grep -i ll *: Case-insensitive search.
- grep -c ll *: Counts matches per file.
- grep '^K' testa testb: Matches lines starting with k.
- grep -n '^' testa: prints all lines with line numbers.

```
vboxuser@Unbuntu:~/lab8/8cat-grep$ grep ll testa
kkkll
llllm
vboxuser@Unbuntu:~/lab8/8cat-grep$ grep -v ll testa
oo--oo
dddkk
vboxuser@Unbuntu:~/lab8/8cat-grep$ grep -n ll testa
1:kkkll
2:llllm
vboxuser@Unbuntu:~/lab8/8cat-grep$ grep -l ll *
testa
vboxuser@Unbuntu:~/lab8/8cat-grep$ grep -i ll *
testa:kkkll
testa:llllm
testb:LLLLL
vboxuser@Unbuntu:~/lab8/8cat-grep$ grep -c ll *
testa:2
testb:0
vboxuser@Unbuntu:~/lab8/8cat-grep$ grep '^K' testa testb
testb:KKKKK
vboxuser@Unbuntu:~/lab8/8cat-grep$ grep -n '^' testa
1:kkkll
2:llllm
3:oo--oo
4:dddkk
vboxuser@Unbuntu:~/lab8/8cat-grep$
```

Figure 4: Executing grep commands

v. Define, Use, and Manage Aliases

Commands Used:

alias lsal=‘ls -al’

alias

cd ~
lsal

```
vboxuser@Unbuntu:~/lab8/8cat-grep$ alias lsal='ls -al'
vboxuser@Unbuntu:~/lab8/8cat-grep$ alias
alias alert='notify-send --urgency=low -i "$([ $? = 0 ] && echo terminal || echo error)" "$(history|tail -n1|sed -e '\''s/^\s*[0-9]\+\s*//;s/[;&|]\s*alert$//'
\'')"'
alias egrep='egrep --color=auto'
alias fgrep='fgrep --color=auto'
alias grep='grep --color=auto'
alias l='ls -CF'
alias la='ls -A'
alias ll='ls -alF'
alias ls='ls --color=auto'
alias lsal='ls -al'
vboxuser@Unbuntu:~/lab8/8cat-grep$ lsal
total 16
drwxrwxr-x 2 vboxuser vboxuser 4096 Dec 28 16:09 .
drwxrwxr-x 4 vboxuser vboxuser 4096 Dec 28 16:06 ..
-rw-rw-r-- 1 vboxuser vboxuser   24 Dec 28 16:09 testa
-rw-rw-r-- 1 vboxuser vboxuser   24 Dec 28 16:09 testb
vboxuser@Unbuntu:~/lab8/8cat-grep$
```

Figure 5: Defining Aliases and using it

```
vboxuser@Unbuntu:~/lab8/8cat-grep$ cd ~
vboxuser@Unbuntu:~$ lsal
total 80
drwxr-x--- 17 vboxuser vboxuser 4096 Dec 28 16:06 .
drwxr-xr-x  3 root     root     4096 Dec 28 13:54 ..
-rw-r--r--  1 vboxuser vboxuser  220 Mar 31  2024 .bash_logout
-rw-r--r--  1 vboxuser vboxuser 3771 Mar 31  2024 .bashrc
drwx------  9 vboxuser vboxuser 4096 Dec 28 16:03 .cache
drwx------ 11 vboxuser vboxuser 4096 Dec 28 15:45 .config
drwxr-xr-x  2 vboxuser vboxuser 4096 Dec 28 13:55 Desktop
drwxr-xr-x  2 vboxuser vboxuser 4096 Dec 28 13:55 Documents
drwxr-xr-x  2 vboxuser vboxuser 4096 Dec 28 13:55 Downloads
drwx------  2 vboxuser vboxuser 4096 Dec 28 15:45 .gnupg
drwxrwxr-x  4 vboxuser vboxuser 4096 Dec 28 16:06 lab8
drwx------  4 vboxuser vboxuser 4096 Dec 28 13:55 .local
drwxr-xr-x  2 vboxuser vboxuser 4096 Dec 28 13:55 Music
drwxr-xr-x  2 vboxuser vboxuser 4096 Dec 28 13:55 Pictures
-rw-r--r--  1 vboxuser vboxuser  807 Mar 31  2024 .profile
drwxr-xr-x  2 vboxuser vboxuser 4096 Dec 28 13:55 Public
drwx------  4 vboxuser vboxuser 4096 Dec 28 15:10 snap
drwx------  2 vboxuser vboxuser 4096 Dec 28 13:54 .ssh
-rw-r--r--  1 vboxuser vboxuser    0 Dec 28 16:01 .sudo_as_admin_successful
drwxr-xr-x  2 vboxuser vboxuser 4096 Dec 28 13:55 Templates
drwxr-xr-x  2 vboxuser vboxuser 4096 Dec 28 13:55 Videos
vboxuser@Unbuntu:~$
```

Figure 6: Managing Aliases

vi. Remove the alias, and show the system does not store it

Commands Used:

unalias lsal

alias

lsal

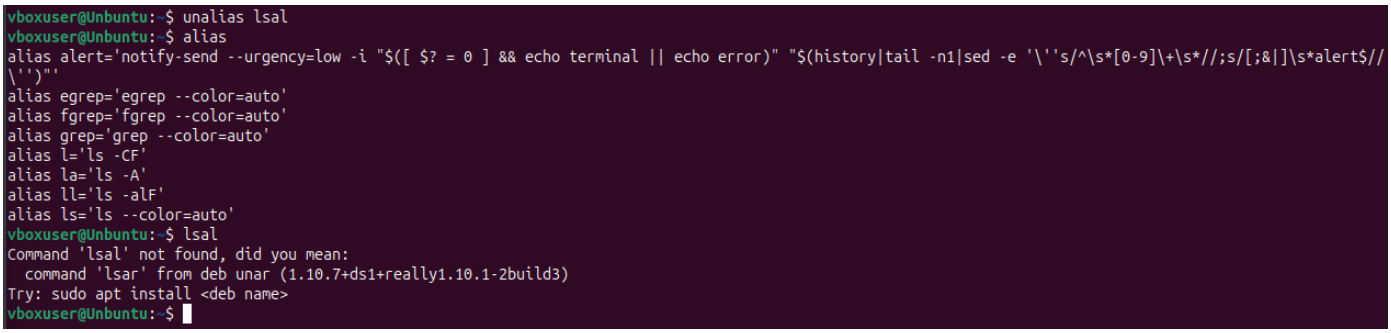

Figure 7: Removing the Alias

vii. Define the Alias Again, Preserving it for the Next Session,

Commands Used:

echo “alias lsal=’ls -al’ ” >> ~/.bashrc
source ~/.bashrc
alias

Explanation:

- Adding the alias definition to the ~/.bashrc file so it persists across sessions.
- Reloads the ~/.bashrc file to apply changes immediately without restarting the terminal.
- Lists all currently defined aliases in the shell.
- Tests the alias by executing ls -al through the alias lsal.

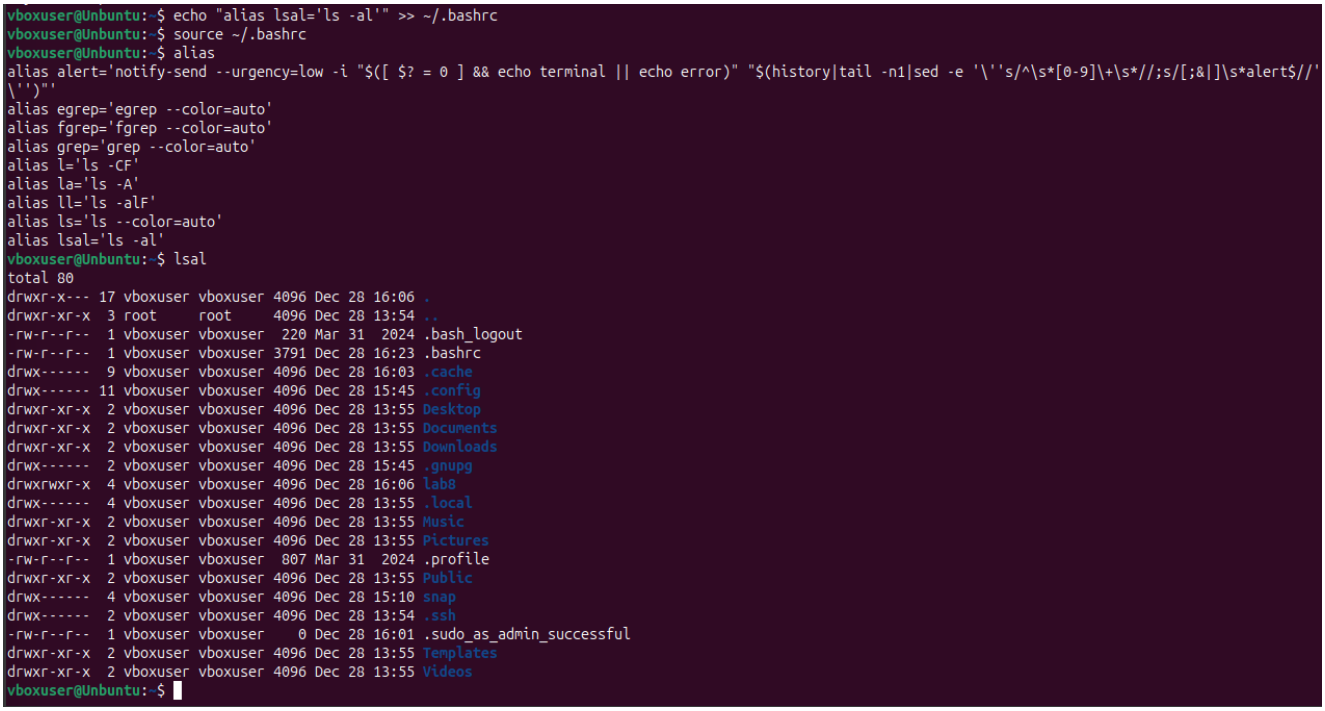

Figure 8: Redefining Alias again

viii. Define nwho alias for the number of system file

Commands Used:

```
alias nwho=’getent passwd | wc -1’
nwho
```

Explanation:

- getent passwd : Retrieves entries from the system’s password database, which includes user account information.
- wc -1 : Counts the number of lines output by the getent passwd command, efficiently counting the number of users on the system.

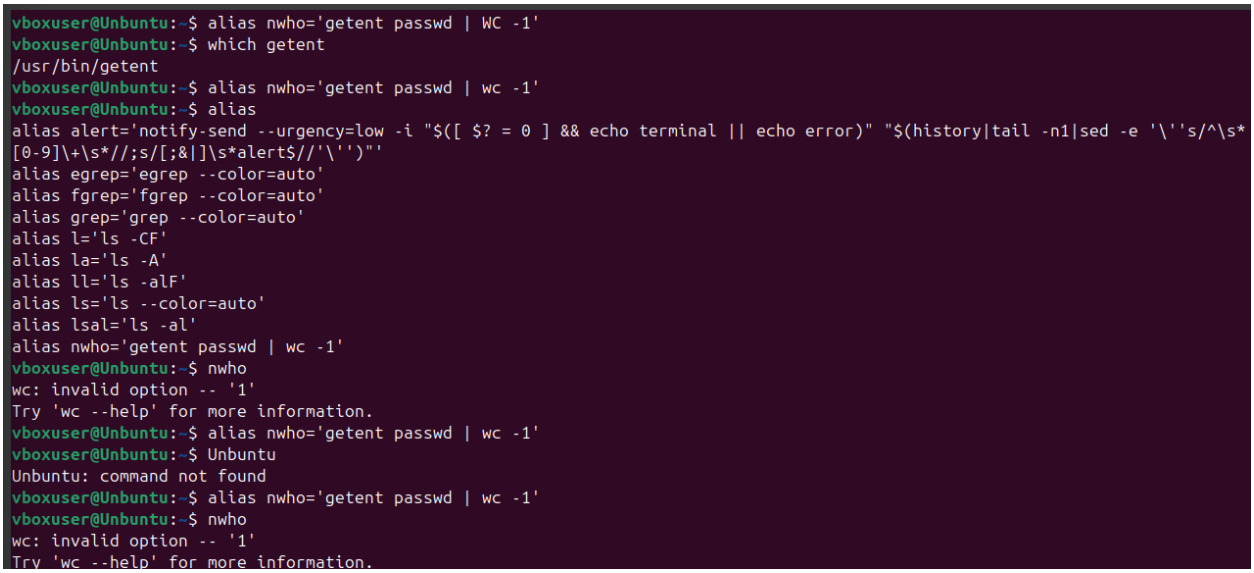

Figure 9: Defining nwho alias

ix. List last Executed Commands

Command used:

history

```
vboxuser@Unbuntu:~$ history
    1  tree
    2  sudo apt update
    3  sudo apt install tree
    4  tree --version
    5  tree
    6  mkdir -p lab8/{8cat-grep,other}
    7  tree
    8  cd lab8/8cat-grep
    9  cat>testa<<EOF
   10  kkkll
   11  lllm
   12  oo--oo
   13  dddkk
   14  EOF
   15  cat>testb<<EOF
   16  KKKKK
   17  LLLLL
   18  MMMMM
   19  DDDDD
   20  EOF
   21  grep ll testa
   22  grep -v ll testa
   23  grep -n ll testa
   24  grep -l ll *
   25  grep -i ll *
   26  grep -c ll *
   27  grep '^K' testa testb
   28  grep -n '^' testa
   29  alias lsal='ls -al'
   30  alias
   31  lsal
   32  cd ~
   33  lsal
```

Figure 10: History 1-32

```
34  unalias lsal
35  alias
36  lsal
37  echo "alias lsal='ls -al'" >> ~/.bashrc
38  source ~/.bashrc
39  alias
40  lsal
41  alias nwho='getent passwd | wc -1'
42  nwho
43  alias nwho='getent passwd | wc -1'
44  nwho
45  wc --help
46  health fc
47  health wc
48  ping google.com
49  static ip
50  ip info
51  ip config
52  sudo ip addr add NEW_IP/24 dev INTERFACE_NAME
53  sudo ip addr add 192.168.1.100/24 dev enp3s0
54  ip addr show
55  sudo netplan apply
56  sudo apt install coreutils
57  which wc
58  ip addr
59  ip addr show
60  ls /etc/netplan/
61  sudo nano /etc/netplan/50-cloud-init.yaml
62  sudo ifconfig enp3s0 192.168.1.100 netmask 255.255.255.0 up
63  sudo ip addr add 192.168.1.100/24 dev enp3s0
64  ip addr show
65  sudo apt update
66  sudo apt install net-tools
67  ifconfig
68  ip addr show
69  sudo ip addr add 192.168.1.100/24 dev enp0s3
```

Figure 11: history 33-69

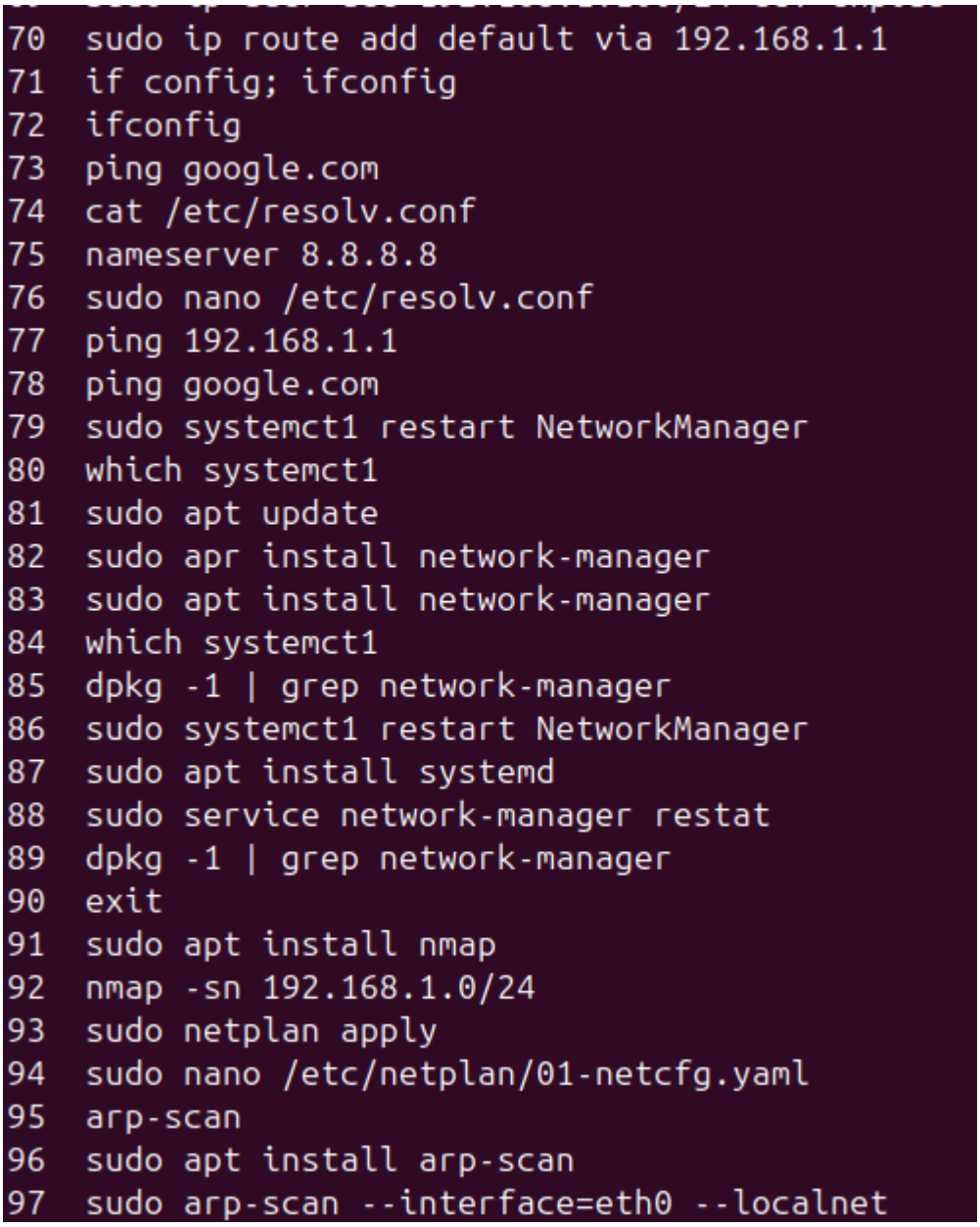

Figure 12: History 70 to 97

```
 86  sudo systemct1 restart NetworkManager
 87  sudo apt install systemd
 88  sudo service network-manager restat
 89  dpkg -1 | grep network-manager
 90  exit
 91  sudo apt install nmap
 92  nmap -sn 192.168.1.0/24
 93  sudo netplan apply
 94  sudo nano /etc/netplan/01-netcfg.yaml
 95  arp-scan
 96  sudo apt install arp-scan
 97  sudo arp-scan --interface=eth0 --localnet
 98  ping 192.168.1.150
 99  192.168.1.x
100  ping 192.168.1.x
101  ping google.com
102  sudo apt update
103  sudo apt install libc-bin
104  alias nwho='getnet passwd | wc -1'
105  nwho
106  getnet passwd | wc -1
107  sudo apt install getent
108  sudo apt getinstall getent
109  .bashrc
110  sudo apt install libc-bin
111  alias nwho='getent passwd | WC -1'
112  which getent
113  alias nwho='getent passwd | wc -1'
114  alias
115  nwho
116  alias nwho='getent passwd | wc -1'
117  Unbuntu
118  alias nwho='getent passwd | wc -1'
119  nwho
120  history
```

Figure 13: History 98 to 120

x. Re-Execute the Last but One Command Using r

Command used:

fc -r

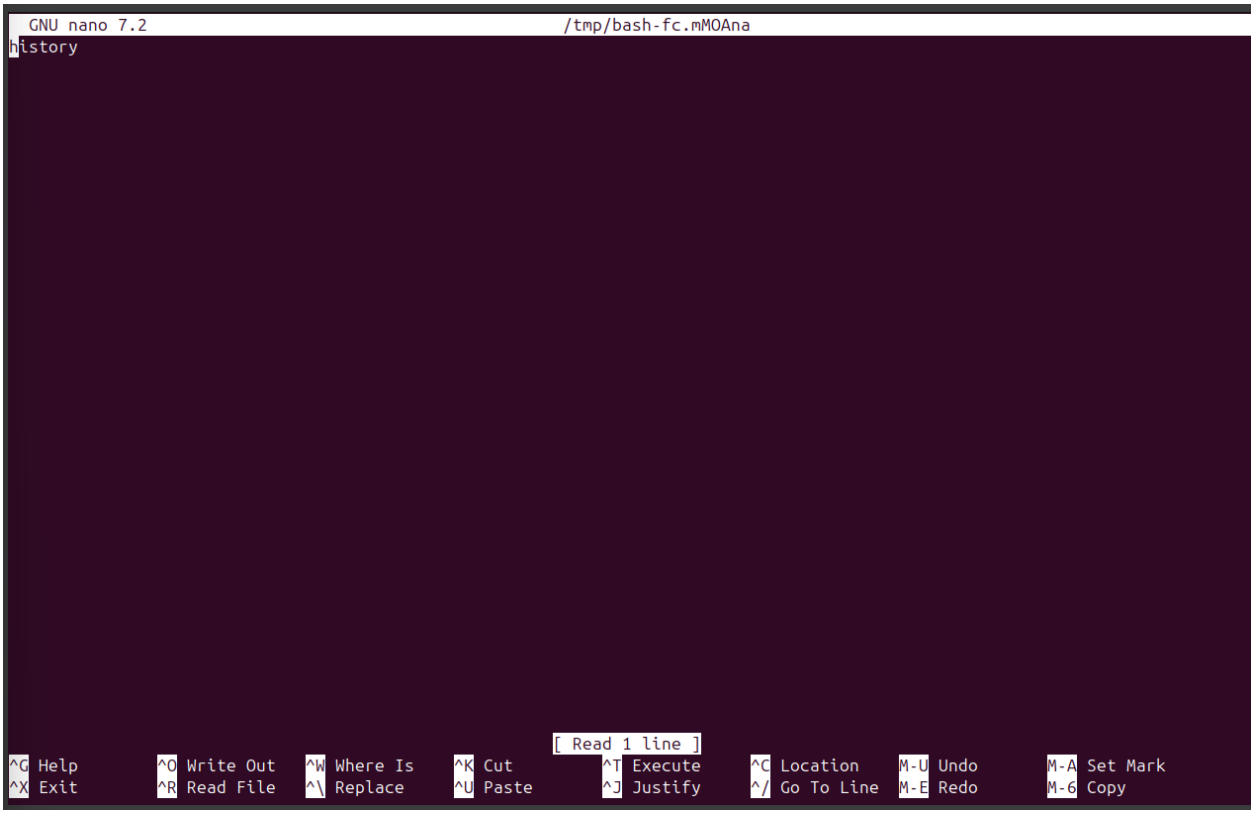

Figure 14: Re-Executing the last but one command using r

xi. Re-Execute the Command Given Three Commands Ago

Command used:

!-3

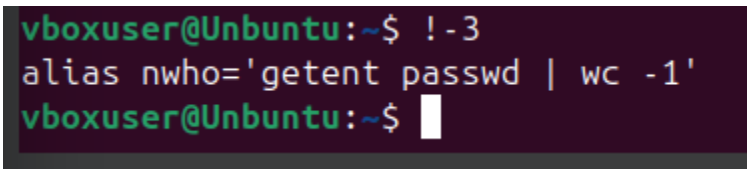

Figure 15: Re-Execute the command given three commands ago

xii. Re-Execute the Last Command That Begins with l

Command used:

fc -e l

```
vboxuser@Unbuntu:~$ fc -e l
/tmp/bash-fc.RtCcz8
alias nwho='getent passwd | wc -1'
vboxuser@Unbuntu:~$
```

Figure 16: Re-Execute the last command that begins with l

Others

```
vboxuser@Unbuntu:~$ sudo apt update
[sudo] password for vboxuser:
Hit:1 http://archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://security.ubuntu.com/ubuntu noble-security InRelease
Get:3 http://archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Hit:4 http://archive.ubuntu.com/ubuntu noble-backports InRelease
Fetched 126 kB in 2s (67.2 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
126 packages can be upgraded. Run 'apt list --upgradable' to see them.
vboxuser@Unbuntu:~$ sudo apt install tree
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  tree
0 upgraded, 1 newly installed, 0 to remove and 126 not upgraded.
Need to get 47.1 kB of archives.
After this operation, 111 kB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu noble/universe amd64 tree amd64 2.1.1-2ubuntu3 [47.1 kB]
Fetched 47.1 kB in 1s (50.7 kB/s)
Selecting previously unselected package tree.
(Reading database ... 148297 files and directories currently installed.)
Preparing to unpack .../tree_2.1.1-2ubuntu3_amd64.deb ...
Unpacking tree (2.1.1-2ubuntu3) ...
Setting up tree (2.1.1-2ubuntu3) ...
Processing triggers for man-db (2.12.0-4build2) ...
vboxuser@Unbuntu:~$ tree --version
tree v2.1.1 © 1996 - 2023 by Steve Baker, Thomas Moore, Francesc Rocher, Florian Sesser, Kyosuke Tokoro
```

Figure 17: Updating and Installing tree

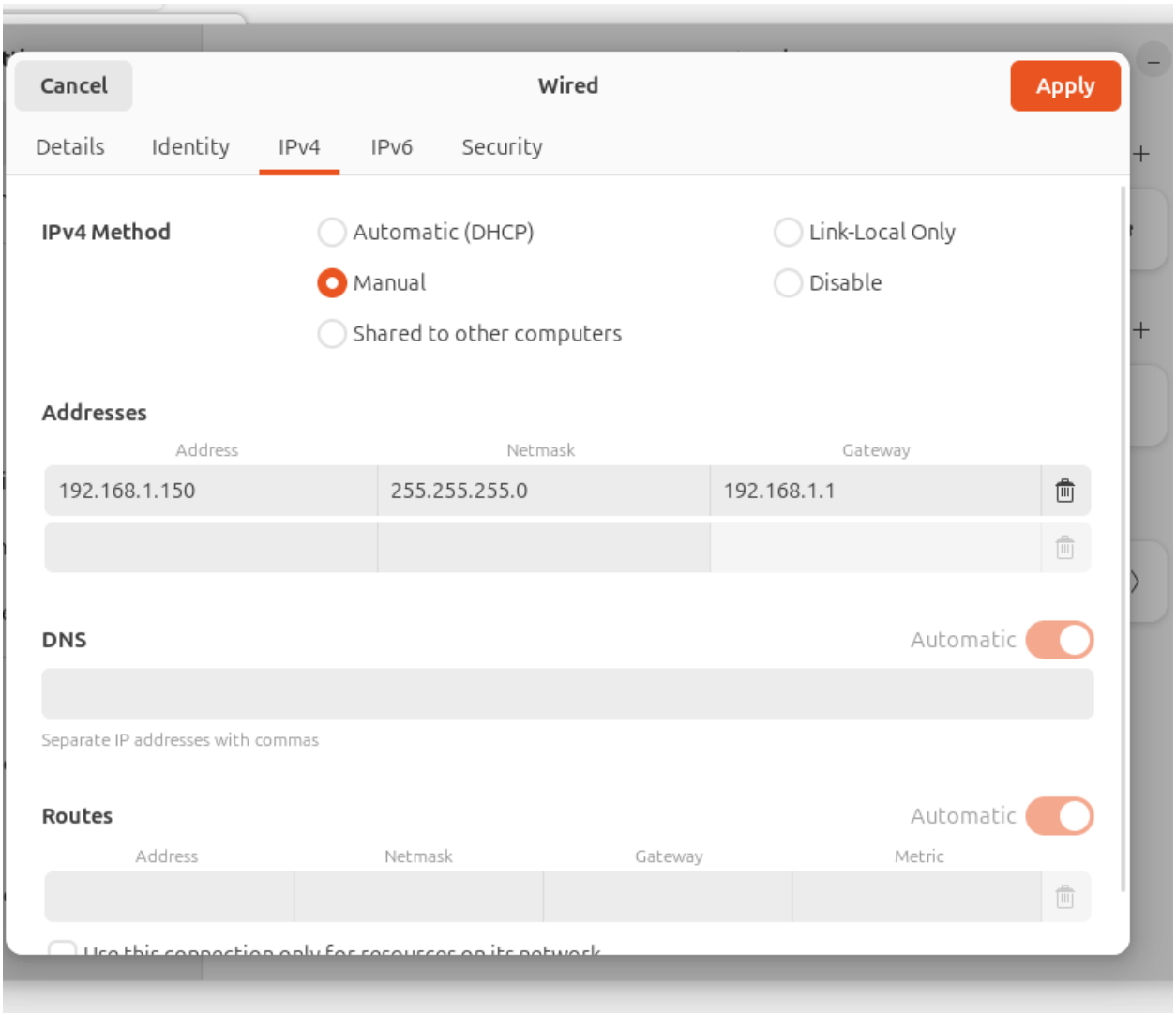

Figure 18: Static IP configuration

5. Conclusion

In this lab, various advanced UNIX utilities and commands were explored to enhance system navigation and efficiency.

i. Creation of directory structures and managed files using mkdir and cat.
ii. Explored grep for efficient text searching and pattern matching.
iii. Defined, managed, and preserved aliases, such as Lsal for ls -al, to improve command-line efficiency.
iv. Leveraged command history to re-execute commands, to enhance workflow effectively.

These activities underscored UNIX's capabilities in automating tasks and processing text data, providing a robust foundation for system administration.

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