SRE TRAINING (DAY 7) - LINUX & SHELL SCRIPTING

RECURSIVE FILE CREATION

Creating nested files and directories

```
root@RheaAlisha:/mnt/c/mthree_practice# mkdir -p a/b/c/d/e
root@RheaAlisha:/mnt/c/mthree_practice# ls -R
.:
a  a.txt  b.txt  c.txt  d.txt  e.txt

./a:
b

./a/b:
c

./a/b/c:
d

./a/b/c/d:
e
```

DELETING RECURSIVELY

Command - **rm -rf <parent_directory>**

`-r` → Recursively deletes all subdirectories and files.

`-f` → Forces deletion without asking for confirmation.

```
root@RheaAlisha:/mnt/c/mthree_practice# rm -rf a
root@RheaAlisha:/mnt/c/mthree_practice# ls -R
.:
a.txt  b.txt  c.txt  d.txt  e.txt
```

Command - **rmdir --ignore-fail-on-non-empty**

```
root@RheaAlisha:/mnt/c/mthree_practice# rmdir --ignore-fail-on-non-empty -p a/b/c/d/e
root@RheaAlisha:/mnt/c/mthree_practice# ls -R
.:
a.txt  b.txt  c.txt  d.txt  e.txt
```

`rmdir` removes only **empty directories**.

`--ignore-fail-on-non-empty` prevents errors when encountering **non-empty** directories.

`-p` removes parent directories **only if they become empty**.

COPYING FILES

cp command is used to copy files

Common flags

-r or -R Copy directories recursively

-f Force overwrite without confirmation

```
root@RheaAlisha:/mnt/c/mthree_practice# cp -rf a f
root@RheaAlisha:/mnt/c/mthree_practice# cd f
root@RheaAlisha:/mnt/c/mthree_practice/f# ls -R
.:
a  e

./a:
a.txt  b

./a/b:
b.txt  c

./a/b/c:
c.txt  d

./a/b/c/d:
d.txt  e

./a/b/c/d/e:
e.txt

./e:
e.txt
```

SYSTEM INFORMATION COMMANDS

uname -a Shows all kernel information.

```
root@RheaAlisha:/mnt/c/mthree_practice/f# uname -a
Linux RheaAlisha 5.15.167.4-microsoft-standard-WSL2 #1 SMP Tue Nov 5 00:21:55 UTC 2024 x86_64 x86_64 x86_64 GNU/Linux
```

hostname Shows the system's hostname.

```
root@RheaAlisha:/mnt/c/mthree_practice/f# hostname
RheaAlisha
```

whoami Show the current logged-in user.

```
root@RheaAlisha:/mnt/c/mthree_practice/f# whoami
root
```

id Show the user's UID, GID, and groups.

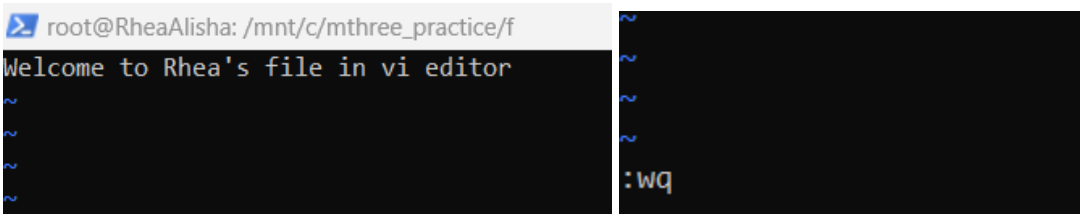
```
root@RheaAlisha:/mnt/c/mthree_practice/f# id
uid=0(root) gid=0(root) groups=0(root)
```

VI EDITOR

Vi editor is a text editor in linux.

Vi has **three** modes:

1. **Normal Mode** → Default mode landing page
2. **Insert Mode** → For typing text (i, a)
3. **Command Mode** → For running commands (:w, q, wq)




```
root@RheaAlisha:/mnt/c/mthree_practice/f# cat file.txt
Welcome to Rhea's file in vi editor
```

PROCESSES

The `ps` and `top` commands are used to monitor system processes.

```
root@RheaAlisha:/mnt/c/mthree_practice/f# ps aux
USER         PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
root           1  0.0  0.1  21748 12924 ?        Ss   13:52   0:00 /sbin/init
root           2  0.0  0.0   2776  1920 ?        Sl   13:52   0:00 /init
root           6  0.0  0.0   2776    68 ?        Sl   13:52   0:00 plan9 --control-socket 7 --log-level 4 --server-fd 8 --pipe-fd 10 --log-truncate
root          51  0.0  0.1  34056 12636 ?        S<s  13:52   0:00 /usr/lib/systemd/systemd-journald
root          93  0.0  0.0  23988  6036 ?        Ss   13:52   0:00 /usr/lib/systemd/systemd-udevd
systemd+     103  0.0  0.1  21452 11924 ?        Ss   13:52   0:00 /usr/lib/systemd/systemd-resolved
systemd+     104  0.0  0.0  91020  6576 ?        Ssl  13:52   0:00 /usr/lib/systemd/systemd-timesyncd
root         156  0.0  0.0   4236  2676 ?        Ss   13:52   0:00 /usr/sbin/cron -f -P
message+     157  0.0  0.0   9532  5132 ?        Ss   13:52   0:00 @dbus-daemon --system --address=systemd: --nofork --nopidfile --systemd-activation --syslog-only
root         165  0.0  0.1  17976  8284 ?        Ss   13:52   0:00 /usr/lib/systemd/systemd-logind
root         168  0.0  0.1 1756096 13996 ?       Ssl  13:52   0:00 /usr/libexec/wsl-pro-service -vv
root         181  0.0  0.0   3160  1228 hvc0     Ss+  13:52   0:00 /sbin/agetty -o -p -- \u --noclear --keep-baud - 115200,38400,9600 vt220
syslog       194  0.0  0.0 222508  5284 ?        Ssl  13:52   0:00 /usr/sbin/rsyslogd -n -iNONE
root         197  0.0  0.0   3116  1184 tty1     Ss+  13:52   0:00 /sbin/agetty -o -p -- \u --noclear - linux
root         206  0.0  0.2 107016 22408 ?        Ssl  13:52   0:00 /usr/bin/python3 /usr/share/unattended-upgrades/unattended-upgrade-shutdown --wait-for-signal
mysql        253  0.9  5.2 2310356 418020 ?      Ssl  13:52   0:32 /usr/sbin/mysqld
root         347  0.0  0.0   2780   204 ?        Ss   13:52   0:00 /init
root         348  0.0  0.0   2780   208 ?        S    13:52   0:00 /init
root         349  0.0  0.0   6068  5320 pts/0    Ss   13:52   0:00 -bash
root         350  0.0  0.0   6664  4260 pts/1    Ss   13:52   0:00 /bin/login -f
root         404  0.0  0.1  20260 11380 ?        Ss   13:52   0:00 /usr/lib/systemd/systemd --user
root         405  0.0  0.0  21152  1712 ?        S    13:52   0:00 (sd-pam)
root         418  0.0  0.0   6072  5148 pts/1    S+   13:52   0:00 -bash
root         640  0.0  0.0   8332  4240 pts/0    R+   14:51   0:00 ps aux
```

kill {PID} command is used to kill a process

kill -9 {PID} - force kill

top command shows running processes in real time with continuous updates

```
top - 14:55:05 up  1:02,  1 user,  load average: 0.02, 0.01, 0.00
Tasks:  24 total,   1 running,  23 sleeping,   0 stopped,   0 zombie
%Cpu(s):  0.0 us,  0.1 sy,  0.0 ni, 99.9 id,  0.0 wa,  0.0 hi,  0.0 si,  0.0 st
MiB Mem :   7789.2 total,   6744.7 free,    983.5 used,    290.1 buff/cache
MiB Swap:   2048.0 total,   2048.0 free,      0.0 used.   6805.7 avail Mem

    PID USER      PR  NI    VIRT    RES    SHR S  %CPU  %MEM     TIME+ COMMAND
    253 mysql     20   0 2310356 418020  36132 S   1.0   5.2   0:34.55 mysqld
      1 root      20   0   21748  12924   9552 S   0.3   0.2   0:00.62 systemd
      2 root      20   0    2776   1920   1796 S   0.0   0.0   0:00.00 init-systemd(Ub
      6 root      20   0    2776     68     68 S   0.0   0.0   0:00.00 init
     51 root      19  -1   34056  12676  11584 S   0.0   0.2   0:00.31 systemd-journal
     93 root      20   0   23988   6036   4864 S   0.0   0.1   0:00.25 systemd-udevd
    103 systemd+  20   0   21452  11924   9728 S   0.0   0.1   0:00.12 systemd-resolve
    104 systemd+  20   0   91020   6576   5724 S   0.0   0.1   0:00.17 systemd-timesyn
    156 root      20   0    4236   2676   2444 S   0.0   0.0   0:00.00 cron
    157 message+  20   0    9532   5132   4500 S   0.0   0.1   0:00.19 dbus-daemon
    165 root      20   0   17976   8284   7264 S   0.0   0.1   0:00.12 systemd-logind
    168 root      20   0 1756096  13996   9448 S   0.0   0.2   0:00.18 wsl-pro-service
    181 root      20   0    3160   1228   1144 S   0.0   0.0   0:00.00 agetty
    194 syslog    20   0  222508   5284   4436 S   0.0   0.1   0:00.11 rsyslogd
    197 root      20   0    3116   1184   1100 S   0.0   0.0   0:00.00 agetty
    206 root      20   0  107016  22408  13068 S   0.0   0.3   0:00.12 unattended-upgr
    347 root      20   0    2780    204     80 S   0.0   0.0   0:00.00 SessionLeader
    348 root      20   0    2780    208     80 S   0.0   0.0   0:00.14 Relay(349)
    349 root      20   0    6068   5320   3628 S   0.0   0.1   0:00.15 bash
    350 root      20   0    6664   4260   3492 S   0.0   0.1   0:00.00 login
    404 root      20   0   20260  11380   9304 S   0.0   0.1   0:00.09 systemd
    405 root      20   0   21152   1712      0 S   0.0   0.0   0:00.00 (sd-pam)
    418 root      20   0    6072   5148   3628 S   0.0   0.1   0:00.01 bash
    673 root      20   0    9388   5256   3092 R   0.0   0.1   0:00.00 top
```

WORD/TEXT PROCESSING

wc - counts lines, words and characters respectively.

```
root@RheaAlisha:/mnt/c/mthree_practice/f# wc file.txt
 1  7 36 file.txt
```

sort - sorts the results alphabetically or otherwise mentioned.

```
root@RheaAlisha:/mnt/c/mthree_practice/f# ls -R | sort -r
file.txt
e.txt
e.txt
e
e
d.txt
d
c.txt
c
b.txt
b
a.txt
a
.:
./e:
./a:
./a/b:
./a/b/c:
./a/b/c/d:
./a/b/c/d/e:
```

LOCATING RESOURCES

`find` command is used to **search for files and directories** based on various criteria like name, size, type, permissions, etc.

```
root@RheaAlisha:/mnt/c/mthree_practice/f# find . -name "file.txt"
./file.txt
```

`whereis` – Locate Binaries, Source, and Man Pages

```
root@RheaAlisha:/mnt/c/mthree_practice# whereis ls
ls: /usr/bin/ls /usr/share/man/man1/ls.1.gz
```

`grep` - used for searching and manipulating text patterns within files.

```
root@RheaAlisha:/mnt/c/mthree_practice# vi a.txt
root@RheaAlisha:/mnt/c/mthree_practice# grep "Rhea" a.txt
Welcome to Rhea's a.txt file
root@RheaAlisha:/mnt/c/mthree_practice#
```

DISK SPACE/USAGE - `df/du` commands

```
root@RheaAlisha:/mnt/c/mthree_practice# df
Filesystem      1K-blocks      Used  Available Use% Mounted on
none              3988056         0    3988056   0% /usr/lib/modules/5.15.167.4-microsoft-standard-WSL2
none              3988056         4    3988052   1% /mnt/wsl
drivers         478104572 182601488  295503084  39% /usr/lib/wsl/drivers
/dev/sdc       1055762868   2039160 1000020236   1% /
none              3988056        76    3987980   1% /mnt/wslg
none              3988056         0    3988056   0% /usr/lib/wsl/lib
rootfs            3984564      2372    3982192   1% /init
none              3988056       516    3987540   1% /run
none              3988056         0    3988056   0% /run/lock
none              3988056         0    3988056   0% /run/shm
tmpfs                4096         0       4096   0% /sys/fs/cgroup
none              3988056        76    3987980   1% /mnt/wslg/versions.txt
none              3988056        76    3987980   1% /mnt/wslg/doc
C:\             478104572 182601488  295503084  39% /mnt/c
tmpfs              797608        16     797592   1% /run/user/0
root@RheaAlisha:/mnt/c/mthree_practice# du
0       ./a/b/c/d/e
0       ./a/b/c/d
0       ./a/b/c
0       ./a/b
0       ./a
0       ./f/a/b/c/d/e
0       ./f/a/b/c/d
0       ./f/a/b/c
0       ./f/a/b
0       ./f/a
0       ./f/e
0       ./f
0       .
```

COMPRESSING / ARCHIVING FILES

gzip compresses individual files, reducing their size.
gunzip decompresses compressed files

Compressing

```
root@RheaAlisha:/mnt/c/mthree_practice# gzip a.txt
root@RheaAlisha:/mnt/c/mthree_practice# ls
a  a.txt.gz  b.txt  c.txt  d.txt  e.txt  f
```

Decompressing

```
root@RheaAlisha:/mnt/c/mthree_practice# gunzip b.txt.gz
root@RheaAlisha:/mnt/c/mthree_practice# ls
a  a.txt  b.txt  c.txt  d.txt  e.txt  f
root@RheaAlisha:/mnt/c/mthree_practice#
```

Compressing without replacing the original file

```
root@RheaAlisha:/mnt/c/mthree_practice# gzip -k c.txt
root@RheaAlisha:/mnt/c/mthree_practice# ls
a  a.txt  b.txt  c.txt  c.txt.gz  d.txt  e.txt  f
root@RheaAlisha:/mnt/c/mthree_practice#
```

tar command - used to bundle multiple files into a single archive.

Flags:

-c Create Create a new archive.
-x Extract Extract files from an archive.
-t List List the contents of an archive.
-v Verbose Display the details (file names) while creating, extracting, or listing an archive.
-f File Specify the name of the archive file.
-z gzip Compress or decompress with gzip.

```
root@RheaAlisha:/mnt/c/mthree_practice# tar -cvf archive.tar a.txt b.txt c.txt d.txt
a.txt
b.txt
c.txt
d.txt
root@RheaAlisha:/mnt/c/mthree_practice# ls
a  a.txt  archive.tar  b.txt  c.txt  c.txt.gz  d.txt  e.txt  f
```

```
root@RheaAlisha:/mnt/c/mthree_practice# tar -tvf archive.tar
-rwxrwxrwx root/root     10240 2025-02-18 17:33 a.txt
-rwxrwxrwx root/root         0 2025-02-17 06:29 b.txt
-rwxrwxrwx root/root         0 2025-02-17 06:29 c.txt
-rwxrwxrwx root/root         0 2025-02-17 06:29 d.txt
root@RheaAlisha:/mnt/c/mthree_practice#
```

```
root@RheaAlisha:/mnt/c/mthree_practice# tar -xvf archive.tar
a.txt
b.txt
c.txt
d.txt
```

NETWORKING COMMANDS

Networking commands are used for troubleshooting, monitoring, and managing network connections.

ip a Display IP addresses assigned to network interfaces

```
root@RheaAlisha:/mnt/c/mthree_practice# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet 10.255.255.254/32 brd 10.255.255.254 scope global lo
       valid_lft forever preferred_lft forever
```

ip r Show routing table

```
root@RheaAlisha:/mnt/c/mthree_practice# ip r
default via 172.30.128.1 dev eth0 proto kernel
172.30.128.0/20 dev eth0 proto kernel scope link src 172.30.140.213
```

ping Test the reachability of a destination

```
root@RheaAlisha:/mnt/c/mthree_practice# ping www.google.com
PING www.google.com (142.250.183.196) 56(84) bytes of data.
64 bytes from bom07s33-in-f4.1e100.net (142.250.183.196): icmp_seq=1 ttl=117 time=15.3 ms
64 bytes from bom07s33-in-f4.1e100.net (142.250.183.196): icmp_seq=2 ttl=117 time=15.1 ms
64 bytes from bom07s33-in-f4.1e100.net (142.250.183.196): icmp_seq=3 ttl=117 time=17.4 ms
64 bytes from bom07s33-in-f4.1e100.net (142.250.183.196): icmp_seq=4 ttl=117 time=17.1 ms
64 bytes from bom07s33-in-f4.1e100.net (142.250.183.196): icmp_seq=5 ttl=117 time=15.4 ms
64 bytes from bom07s33-in-f4.1e100.net (142.250.183.196): icmp_seq=6 ttl=117 time=16.3 ms
64 bytes from bom07s33-in-f4.1e100.net (142.250.183.196): icmp_seq=7 ttl=117 time=15.7 ms
64 bytes from bom07s33-in-f4.1e100.net (142.250.183.196): icmp_seq=8 ttl=117 time=16.3 ms
64 bytes from bom07s33-in-f4.1e100.net (142.250.183.196): icmp_seq=9 ttl=117 time=16.2 ms
64 bytes from bom07s33-in-f4.1e100.net (142.250.183.196): icmp_seq=10 ttl=117 time=15.3 ms
^C
--- www.google.com ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9700ms
rtt min/avg/max/mdev = 15.101/16.010/17.363/0.746 ms
```

SHELL SCRIPTING

A shell script is a program written in a shell (command-line interpreter) that automates tasks by executing a series of commands.

Key points

- Shell scripts have a **.sh** extension
- Before running you need to give execute(+x) permission
- ./filename.sh is command to run the script
- For taking input - **read variable_name**
- Printing - echo $var
- If loops open with **if** and close with **fi**
- We use **do** and **done** block of scope with for and while loops

FIRST SCRIPT

```
name="Rhea Rebecca Robinson"
age=23
echo "Name: $name"
echo "Age: $age"

if [ $age -ge 18 ]; then
        echo "You are eligible to vote"
else
        echo "You are not eligible to vote"
fi
~
```

```
root@RheaAlisha:/mnt/c/mthree_practice# ls -lrt
total 32
-rwxrwxrwx 1 root root     0 Feb 17 06:29 d.txt
-rwxrwxrwx 1 root root    26 Feb 17 06:29 c.txt.gz
-rwxrwxrwx 1 root root     0 Feb 17 06:29 c.txt
-rwxrwxrwx 1 root root     0 Feb 17 06:29 b.txt
-rwxrwxrwx 1 root root     0 Feb 17 06:29 e.txt
drwxrwxrwx 1 root root   512 Feb 18 14:12 a
drwxrwxrwx 1 root root   512 Feb 18 14:46 f
-rwxrwxrwx 1 root root 10240 Feb 18 17:33 a.txt
-rwxrwxrwx 1 root root 20480 Feb 18 17:34 archive.tar
-rwxrwxrwx 1 root root     0 Feb 18 17:42 extractedfiles.txt
-rwxrwxrwx 1 root root   176 Feb 18 18:07 script.sh
root@RheaAlisha:/mnt/c/mthree_practice# ./script.sh
Name: Rhea Rebecca Robinson
Age: 23
You are eligible to vote
```

READONLY VARIABLES - In shell scripting, you can make a variable read-only using the `readonly` command. Once a variable is marked as read-only, it cannot be changed or reassigned.

```
readonly name="Rhea Rebecca Robinson"
readonly age=23
echo "Name: $name"
echo "Age: $age"

name="ALisha"
```

```
root@RheaAlisha:/mnt/c/mthree_practice# ./script.sh
Name: Rhea Rebecca Robinson
Age: 23
./script.sh: line 6: name: readonly variable
```