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COSC 519
Homework 1

1.Install Ubuntu VM on your own Desktop or Laptop to do this homework. You can also use any other VM or Linux environment of your choice and also use our labs.
[Done]

2.Learn about 50 distinct commands of Linux/Unix OS by running them on the system. Each command must be a distinct one, not with different options in the same command.

[Any command that doesn't give output has an ls to demonstrate change]
1. ls -al
```
total 3272
drwxrwxr-x 4 doug doug    4096 Sep 21 17:53 .
drwxrwxr-x 3 doug doug    4096 Sep  7 17:58 ..
-rw-rw-r-- 1 doug doug   12815 Sep 21 17:53 branton_hw1_mk2.odt
-rw-rw-r-- 1 doug doug 1783745 Sep 19 22:19 branton_hw1.odt
-rw-rw-r-- 1 doug doug 1418388 Sep 19 22:20 branton_hw1.pdf
drwxrwxr-x 2 doug doug    4096 Sep 19 20:49 data
drwx------ 2 doug doug    4096 Sep 15 11:12 first
-rw-rw-r-- 1 doug doug   11208 Sep 19 20:58 first.7z
-rw-rw-r-- 1 doug doug   81482 Sep 17 17:54 hw1_1.png
-rw-rw-r-- 1 doug doug      82 Sep 21 17:53 .~lock.branton_hw1_mk2.odt#
-rw-rw-r-- 1 doug doug      82 Sep 19 22:19 .~lock.branton_hw1.odt#
-rwxrwxrwx 1 doug doug     251 Sep 19 22:15 save_sum.sh
-rw-rw-r-- 1 doug doug       3 Sep 19 22:17 sumfile.txt
```

2. cat hw1_out.txt
```
total 3272
drwxrwxr-x 4 doug doug    4096 Sep 21 17:59 .
drwxrwxr-x 3 doug doug    4096 Sep  7 17:58 ..
-rw-rw-r-- 1 doug doug   12815 Sep 21 17:53 branton_hw1_mk2.odt
-rw-rw-r-- 1 doug doug 1783745 Sep 19 22:19 branton_hw1.odt
-rw-rw-r-- 1 doug doug 1418388 Sep 19 22:20 branton_hw1.pdf
drwxrwxr-x 2 doug doug    4096 Sep 19 20:49 data
drwx------ 2 doug doug    4096 Sep 15 11:12 first
-rw-rw-r-- 1 doug doug   11208 Sep 19 20:58 first.7z
-rw-rw-r-- 1 doug doug   81482 Sep 17 17:54 hw1_1.png
-rw-rw-r-- 1 doug doug       0 Sep 21 17:59 hw1_out.txt
-rw-rw-r-- 1 doug doug      82 Sep 21 17:53 .~lock.branton_hw1_mk2.odt#
-rw-rw-r-- 1 doug doug      82 Sep 19 22:19 .~lock.branton_hw1.odt#
```

-rwxrwxrwx 1 doug doug 251 Sep 19 22:15 save_sum.sh
-rw-rw-r-- 1 doug doug 3 Sep 19 22:17 sumfile.txt

3. (base) doug@pop-os:~/grad/cosc519/hw1$ cd ..
(base) doug@pop-os:~/grad/cosc519$ ls
hw1

4. head hw1_out.txt
total 3272
drwxrwxr-x 4 doug doug 4096 Sep 21 17:59 .
drwxrwxr-x 3 doug doug 4096 Sep 7 17:58 ..
-rw-rw-r-- 1 doug doug 12815 Sep 21 17:53 branton_hw1_mk2.odt
-rw-rw-r-- 1 doug doug 1783745 Sep 19 22:19 branton_hw1.odt
-rw-rw-r-- 1 doug doug 1418388 Sep 19 22:20 branton_hw1.pdf
drwxrwxr-x 2 doug doug 4096 Sep 19 20:49 data
drwx------ 2 doug doug 4096 Sep 15 11:12 first
-rw-rw-r-- 1 doug doug 11208 Sep 19 20:58 first.7z
-rw-rw-r-- 1 doug doug 81482 Sep 17 17:54 hw1_1.png
5. tail hw1_out.txt
total 3272
drwxrwxr-x 4 doug doug 4096 Sep 21 17:59 .
drwxrwxr-x 3 doug doug 4096 Sep 7 17:58 ..
-rw-rw-r-- 1 doug doug 12815 Sep 21 17:53 branton_hw1_mk2.odt
-rw-rw-r-- 1 doug doug 1783745 Sep 19 22:19 branton_hw1.odt
-rw-rw-r-- 1 doug doug 1418388 Sep 19 22:20 branton_hw1.pdf
drwxrwxr-x 2 doug doug 4096 Sep 19 20:49 data
drwx------ 2 doug doug 4096 Sep 15 11:12 first
-rw-rw-r-- 1 doug doug 11208 Sep 19 20:58 first.7z
-rw-rw-r-- 1 doug doug 81482 Sep 17 17:54 hw1_1.png

6. pwd
/home/doug/grad/cosc519/hw1

7. mkdir test
(base) doug@pop-os:~/grad/cosc519/hw1$ ls
branton_hw1_mk2.odt branton_hw1.odt branton_hw1.pdf data first first.7z hw1_1.png hw1_out.txt save_sum.sh sumfile.txt test

8. mv test test2
(base) doug@pop-os:~/grad/cosc519/hw1$ ls
branton_hw1_mk2.odt branton_hw1.odt branton_hw1.pdf data first first.7z hw1_1.png hw1_out.txt save_sum.sh sumfile.txt test2

9. rm -rf test2
(base) doug@pop-os:~/grad/cosc519/hw1$ ls
branton_hw1_mk2.odt branton_hw1.odt branton_hw1.pdf data first first.7z hw1_1.png hw1_out.txt save_sum.sh sumfile.txt

10. touch test.txt
(base) doug@pop-os:~/grad/cosc519/hw1$ ls
branton_hw1_mk2.odt branton_hw1.odt branton_hw1.pdf data first first.7z hw1_1.png
hw1_out.txt save_sum.sh sumfile.txt test.txt

11. cp test.txt test2.txt
(base) doug@pop-os:~/grad/cosc519/hw1$ ls
branton_hw1_mk2.odt branton_hw1.odt branton_hw1.pdf data first first.7z hw1_1.png
hw1_out.txt save_sum.sh sumfile.txt test2.txt test.txt

12. id
uid=1000(doug) gid=1000(doug) groups=1000(doug),4(adm),27(sudo)

13. who
doug   :1   2021-08-31 15:23 (:1)
14. w
 18:15:40 up 21 days, 2:52, 1 user, load average: 0.50, 0.39, 0.37
USER   TTY   FROM   LOGIN@   IDLE   JCPU   PCPU WHAT
doug   :1   :1   31Aug21 ?xdm?   1:46m 0.01s /usr/lib/gdm3/gdm-x-session --run-script env
GNOME_SHELL_SESSION_MODE=pop /usr/bin/gnome-session --systemd --session=pop
15. w
 18:15:48 up 21 days, 2:52, 1 user, load average: 0.50, 0.40, 0.38
USER   TTY   FROM   LOGIN@   IDLE   JCPU   PCPU WHAT
doug   :1   :1   31Aug21 ?xdm?   1:47m 0.01s /usr/lib/gdm3/gdm-x-session --run-script env
GNOME_SHELL_SESSION_MODE=pop /usr/bin/gnome-session --systemd --session=pop
16. ps
    PID TTY   TIME CMD
   5968 pts/0   00:00:00 bash
  74726 pts/0   00:00:00 ps

17. uname
Linux
18. uptime
 18:27:42 up 21 days, 3:04, 1 user, load average: 0.15, 0.24, 0.30
19. hostname
pop-os
20. date
Tue 21 Sep 2021 06:27:49 PM EDT
21. last
doug   :1   :1   Tue Aug 31 15:23   still logged in
reboot   system boot 5.11.0-7614-gene Tue Aug 31 15:23   still running
doug   :1   :1   Mon Aug 9 19:13 - crash (21+20:09)
reboot   system boot 5.11.0-7614-gene Mon Aug 9 19:13   still running
doug   :1   :1   Thu Jul 22 17:23 - crash (18+01:50)
reboot   system boot 5.11.0-7614-gene Mon Jul 19 19:35   still running
doug   :1   :1   Thu Jul 15 17:43 - crash (4+01:52)
reboot   system boot 5.11.0-7614-gene Thu Jul 15 17:43   still running
doug   :1   :1   Sun Jul 11 20:08 - crash (3+21:35)
reboot   system boot 5.11.0-7614-gene Sun Jul 11 20:07   still running

```
doug     :1           :1             Sun Jun 20 12:45 - crash (21+07:22)
reboot   system boot  5.11.0-7614-gene Sun Jun 20 12:44   still running
doug     :1           :1             Sun Jun  6 16:07 - crash (13+20:37)
doug     :1           :1             Sun May 30 15:36 - 15:17  (23:41)
reboot   system boot  5.4.0-7642-gener Sun May 30 15:35   still running
doug     :1           :1             Sat May 29 19:51 - crash  (19:43)
reboot   system boot  5.4.0-7642-gener Sat May 29 19:46   still running
doug     :1           :1             Wed Mar 17 17:36 - crash (73+02:09)
```

22. chmod 777 test.txt

```
(base) doug@pop-os:~/grad/cosc519/hw1$ ls -l
total 3264
-rw-rw-r-- 1 doug doug   17791 Sep 21 18:29 branton_hw1_mk2.odt
-rw-rw-r-- 1 doug doug 1783745 Sep 19 22:19 branton_hw1.odt
-rw-rw-r-- 1 doug doug 1418388 Sep 19 22:20 branton_hw1.pdf
drwxrwxr-x 2 doug doug    4096 Sep 19 20:49 data
drwx------ 2 doug doug    4096 Sep 15 11:12 first
-rw-rw-r-- 1 doug doug   11208 Sep 19 20:58 first.7z
-rw-rw-r-- 1 doug doug   81482 Sep 17 17:54 hw1_1.png
-rw-rw-r-- 1 doug doug     802 Sep 21 17:59 hw1_out.txt
-rwxrwxrwx 1 doug doug     251 Sep 19 22:15 save_sum.sh
-rw-rw-r-- 1 doug doug       3 Sep 19 22:17 sumfile.txt
-rw-rw-r-- 1 doug doug       0 Sep 21 18:14 test2.txt
-rwxrwxrwx 1 doug doug       0 Sep 21 18:13 test.txt
```

23. cal

```
   September 2021
Su Mo Tu We Th Fr Sa
         1  2  3  4
 5  6  7  8  9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28 29 30
```

24. whoami

```
doug
```

25.df

```
Filesystem     1K-blocks     Used Available Use% Mounted on
udev             3963368        0   3963368   0% /dev
tmpfs             803144     2236    800908   1% /run
/dev/nvme0n1p3 470908196 31096060 415821556   7% /
tmpfs            4015708    17716   3997992   1% /dev/shm
tmpfs               5120        0      5120   0% /run/lock
tmpfs            4015708        0   4015708   0% /sys/fs/cgroup
/dev/nvme0n1p1    508932   303260    205672  60% /boot/efi
/dev/nvme0n1p2   4186100  2176660   2009440  52% /recovery
tmpfs             803140       20    803120   1% /run/user/110
tmpfs             803140      140    803000   1% /run/user/1000
```

26. sudo fdisk -l
[sudo] password for doug:
Disk /dev/nvme0n1: 465.78 GiB, 500107862016 bytes, 976773168 sectors
Disk model: Samsung SSD 970 EVO Plus 500GB
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: gpt
Disk identifier: 63F47F30-7928-43D5-B502-F8BD6D3CE7EA

Device	Start	End	Sectors	Size	Type
/dev/nvme0n1p1	4096	1023998	1019903	498M	EFI System
/dev/nvme0n1p2	1024000	9412606	8388607	4G	Microsoft basic data
/dev/nvme0n1p3	9412608	968380462	958967855	457.3G	Linux filesystem
/dev/nvme0n1p4	968380464	976769070	8388607	4G	Linux swap

Disk /dev/mapper/cryptswap: 3.102 GiB, 4294442496 bytes, 8387583 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes

27. netstat -nutlp
(Not all processes could be identified, non-owned process info
will not be shown, you would have to be root to see it all.)
Active Internet connections (only servers)

Proto	Recv-Q	Send-Q	Local Address	Foreign Address	State	PID/Program name
tcp	0	0	127.0.0.1:55307	0.0.0.0:*	LISTEN	65483/python
tcp	0	0	127.0.0.1:37269	0.0.0.0:*	LISTEN	65483/python
tcp	0	0	127.0.0.53:53	0.0.0.0:*	LISTEN	-
tcp	0	0	127.0.0.1:631	0.0.0.0:*	LISTEN	-
tcp	0	0	127.0.0.1:8888	0.0.0.0:*	LISTEN	65377/python
tcp	0	0	127.0.0.1:49757	0.0.0.0:*	LISTEN	65483/python
tcp	0	0	127.0.0.1:39229	0.0.0.0:*	LISTEN	65483/python
tcp	0	0	127.0.0.1:38463	0.0.0.0:*	LISTEN	2630/expressvpn-age
tcp	0	0	127.0.0.1:2015	0.0.0.0:*	LISTEN	-
tcp	0	0	127.0.0.1:37061	0.0.0.0:*	LISTEN	65483/python
tcp	0	0	127.0.0.1:45157	0.0.0.0:*	LISTEN	65483/python
tcp	0	0	127.0.0.1:42377	0.0.0.0:*	LISTEN	64267/expressvpn-br
tcp6	0	0	::1:631	:::*	LISTEN	-

28. ifconfig
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 193534 bytes 64376376 (64.3 MB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 193534 bytes 64376376 (64.3 MB)

```
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

wlp58s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.250.56.161  netmask 255.255.240.0  broadcast 10.250.63.255
        inet6 fe80::942e:18c4:b372:f5bf  prefixlen 64  scopeid 0x20<link>
        ether 9c:b6:d0:d1:ed:91  txqueuelen 1000  (Ethernet)
        RX packets 1853993  bytes 2330462683 (2.3 GB)
        RX errors 0  dropped 66  overruns 0  frame 0
        TX packets 481313  bytes 101390053 (101.3 MB)


29. cmp new_file.txt hw1.txt
new_file.txt hw1.txt differ: byte 1, line 1

30. comm new_file.txt hw1.txt
apples
bananas
                hw1.txt
oranges
comm: file 1 is not in sorted order
kiwi

                test1.txt
31. diff new_file.txt hw1.txt
1,5c1,2
< apples
< bananas
< oranges
< kiwi
<
---
> hw1.txt
> test1.txt
32. diff3 new_file.txt hw1.txt test1.txt
====2
1:1,5c
3:1,5c
  apples
  bananas
  oranges
  kiwi

2:1,2c
  hw1.txt
  test1.txt

33. dir
hw1.txt  new_file.txt  newhw1.txt  test1.txt
```

34. dircolors
LS_COLORS='rs=0:di=01;34:ln=01;36:mh=00:pi=40;33:so=01;35:do=01;35:bd=40;33;01:cd=40;33;0
1:or=40;31;01:mi=00:su=37;41:sg=30;43:ca=30;41:tw=30;42:ow=34;42:st=37;44:ex=01;32:*.tar=01;3
1:*.tgz=01;31:*.arc=01;31:*.arj=01;31:*.taz=01;31:*.lha=01;31:*.lz4=01;31:*.lzh=01;31:*.lzma=01;3
1:*.tlz=01;31:*.txz=01;31:*.tzo=01;31:*.t7z=01;31:*.zip=01;31:*.z=01;31:*.dz=01;31:*.gz=01;31:*.lr
z=01;31:*.lz=01;31:*.lzo=01;31:*.xz=01;31:*.zst=01;31:*.tzst=01;31:*.bz2=01;31:*.bz=01;31:*.tbz=0
1;31:*.tbz2=01;31:*.tz=01;31:*.deb=01;31:*.rpm=01;31:*.jar=01;31:*.war=01;31:*.ear=01;31:*.sar=0
1;31:*.rar=01;31:*.alz=01;31:*.ace=01;31:*.zoo=01;31:*.cpio=01;31:*.7z=01;31:*.rz=01;31:*.cab=01
;31:*.wim=01;31:*.swm=01;31:*.dwm=01;31:*.esd=01;31:*.jpg=01;35:*.jpeg=01;35:*.mjpg=01;35:*.
mjpeg=01;35:*.gif=01;35:*.bmp=01;35:*.pbm=01;35:*.pgm=01;35:*.ppm=01;35:*.tga=01;35:*.xbm=
01;35:*.xpm=01;35:*.tif=01;35:*.tiff=01;35:*.png=01;35:*.svg=01;35:*.svgz=01;35:*.mng=01;35:*.p
cx=01;35:*.mov=01;35:*.mpg=01;35:*.mpeg=01;35:*.m2v=01;35:*.mkv=01;35:*.webm=01;35:*.og
m=01;35:*.mp4=01;35:*.m4v=01;35:*.mp4v=01;35:*.vob=01;35:*.qt=01;35:*.nuv=01;35:*.wmv=01;
35:*.asf=01;35:*.rm=01;35:*.rmvb=01;35:*.flc=01;35:*.avi=01;35:*.fli=01;35:*.flv=01;35:*.gl=01;35
:*.dl=01;35:*.xcf=01;35:*.xwd=01;35:*.yuv=01;35:*.cgm=01;35:*.emf=01;35:*.ogv=01;35:*.ogx=01;
35:*.aac=00;36:*.au=00;36:*.flac=00;36:*.m4a=00;36:*.mid=00;36:*.midi=00;36:*.mka=00;36:*.mp3
=00;36:*.mpc=00;36:*.ogg=00;36:*.ra=00;36:*.wav=00;36:*.oga=00;36:*.opus=00;36:*.spx=00;36:*.
xspf=00;36:';
export LS_COLORS

35. dirs
~/grad/cosc519/hw1/data

36.du
20	.

37. file hw1.txt
hw1.txt: ASCII text

38. gzip hw1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt.gz new_file.txt newhw1.txt test1.txt
39. gunzip hw1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt new_file.txt newhw1.txt test1.txt

40. logname
doug
41. nl test1.txt
    1	apples
    2	bananas
    3	oranges
    4	kiwi

42. rev hw1.txt
txt.1wh
txt.1tset

43.scp hw1.txt newhw1.txt

```
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt  new_file.txt  newhw1.txt  test1.txt

44.  sort new_file.txt

apples
bananas
kiwi
oranges

45.  sum hw1.txt
23389     1

46. type mv
mv is hashed (/usr/bin/mv)

47. tty
/dev/pts/0

48. which ls
/usr/bin/ls
49. !!
which ls
/usr/bin/ls

50. vmstat
procs -----------memory---------- ---swap-- -----io---- -system-- ------cpu-----
 r  b   swpd   free   buff  cache   si   so    bi    bo   in   cs us sy id wa st
 1  0 2441012 128292  27804 1314612    5   36    81   104   80   86 11  4 86  0  0
```

3.Learn the command (Objdump) some options to capture output. Use some real *.obj or *.exe files to test this command.

```
(base) doug@pop-os:~/grad/cosc519/hw1/first$ objdump hello -s

hello:     file format elf64-x86-64

Contents of section .interp:
 0238 2f6c6962 36342f6c 642d6c69 6e75782d  /lib64/ld-linux-
 0248 7838362d 36342e73 6f2e3200           x86-64.so.2.
Contents of section .note.ABI-tag:
 0254 04000000 10000000 01000000 474e5500  ............GNU.
 0264 00000000 03000000 02000000 00000000  ................
Contents of section .note.gnu.build-id:
 0274 04000000 14000000 03000000 474e5500  ............GNU.
```

```
 0284 d04a3604 592b0496 9b9a2f54 1ca963eb  .J6.Y+..../T..c.
 0294 ad6852ee                             .hR.
Contents of section .gnu.hash:
 0298 01000000 01000000 01000000 00000000  ................
 02a8 00000000 00000000 00000000           ............
Contents of section .dynsym:
 02b8 00000000 00000000 00000000 00000000  ................
 02c8 00000000 00000000 66000000 20000000  ........f... ...
 02d8 00000000 00000000 00000000 00000000  ................
 02e8 0b000000 12000000 00000000 00000000  ................
 02f8 00000000 00000000 10000000 12000000  ................
 0308 00000000 00000000 00000000 00000000  ................
 0318 21000000 12000000 00000000 00000000  !...............
 0328 00000000 00000000 3e000000 12000000  ........>.......
 0338 00000000 00000000 00000000 00000000  ................
 0348 82000000 20000000 00000000 00000000  .... ...........
 0358 00000000 00000000 28000000 12000000  ........(.......
 0368 00000000 00000000 00000000 00000000  ................
 0378 91000000 20000000 00000000 00000000  .... ...........
 0388 00000000 00000000 2f000000 22000000  ......../..."...
 0398 00000000 00000000 00000000 00000000  ................
Contents of section .dynstr:
 03a8 006c6962 632e736f 2e360070 75747300  .libc.so.6.puts.
 03b8 5f5f7374 61636b5f 63686b5f 6661696c  __stack_chk_fail
 03c8 00707269 6e746600 6d616c6c 6f63005f  .printf.malloc._
 03d8 5f637861 5f66696e 616c697a 65005f5f  _cxa_finalize.__
 03e8 6c696263 5f737461 72745f6d 61696e00  libc_start_main.
 03f8 474c4942 435f322e 3400474c 4942435f  GLIBC_2.4.GLIBC_
 0408 322e322e 35005f49 544d5f64 65726567  2.2.5._ITM_dereg
 0418 69737465 72544d43 6c6f6e65 5461626c  isterTMCloneTabl
 0428 65005f5f 676d6f6e 5f737461 72745f5f  e.__gmon_start__
 0438 005f4954 4d5f7265 67697374 6572544d  ._ITM_registerTM
 0448 436c6f6e 65546162 6c6500             CloneTable.
Contents of section .gnu.version:
 0454 00000000 02000300 02000200 00000200  ................
 0464 00000200                             ....
Contents of section .gnu.version_r:
 0468 01000200 01000000 10000000 00000000  ................
 0478 1469690d 00000300 50000000 10000000  .ii.....P.......
```

```
 0488 751a6909 00000200 5a000000 00000000  u.i.....Z.....…
[TRUNCATED OUTPUT]

(base) doug@pop-os:~/grad/cosc519/hw1/first$ objdump -Sr hello.o

hello.o:     file format elf64-x86-64


Disassembly of section .text:

0000000000000000 <main>:
   0:   55                      push   %rbp
   1:   48 89 e5                mov    %rsp,%rbp
   4:   48 83 ec 70             sub    $0x70,%rsp
   8:   89 7d 9c                mov    %edi,-0x64(%rbp)
   b:   48 89 75 90             mov    %rsi,-0x70(%rbp)
   f:   64 48 8b 04 25 28 00    mov    %fs:0x28,%rax
  16:   00 00
  18:   48 89 45 f8             mov    %rax,-0x8(%rbp)
  1c:   31 c0                   xor    %eax,%eax
  1e:   c7 45 ac 00 00 00 00    movl   $0x0,-0x54(%rbp)
  25:   48 c7 45 b0 00 00 00    movq   $0x0,-0x50(%rbp)
  2c:   00
  2d:   48 b8 54 68 69 73 20    movabs $0x2073692073696854,%rax
  34:   69 73 20
  37:   48 ba 61 20 73 74 72    movabs $0x676e697274732061,%rdx
  3e:   69 6e 67
  41:   48 89 45 d0             mov    %rax,-0x30(%rbp)
  45:   48 89 55 d8             mov    %rdx,-0x28(%rbp)
  49:   48 c7 45 e0 00 00 00    movq   $0x0,-0x20(%rbp)
  50:   00
  51:   48 c7 45 e8 00 00 00    movq   $0x0,-0x18(%rbp)
  58:   00
  59:   48 c7 45 f0 00 00 00    movq   $0x0,-0x10(%rbp)
  60:   00
  61:   bf c8 00 00 00          mov    $0xc8,%edi
  66:   e8 00 00 00 00          callq  6b <main+0x6b>
                        67: R_X86_64_PLT32  malloc-0x4
  6b:   48 89 45 b8             mov    %rax,-0x48(%rbp)
```

```
6f:  bf c8 00 00 00            mov    $0xc8,%edi
74:  e8 00 00 00 00            callq  79 <main+0x79>
                    75: R_X86_64_PLT32  malloc-0x4
79:  48 89 45 c0               mov    %rax,-0x40(%rbp)
7d:  bf c8 00 00 00            mov    $0xc8,%edi
82:  e8 00 00 00 00            callq  87 <main+0x87>
                    83: R_X86_64_PLT32  malloc-0x4
87:  48 89 45 c8               mov    %rax,-0x38(%rbp)
8b:  c6 45 aa 58          movb   $0x58,-0x56(%rbp)
8f:  c6 45 ab 44               movb   $0x44,-0x55(%rbp)
93:  c7 45 ac 00 01 00 00      movl   $0x100,-0x54(%rbp)
9a:  48 b8 ef cd ab 89 67      movabs $0x123456789abcdef,%rax
a1:  45 23 01
a4:  48 89 45 b0               mov    %rax,-0x50(%rbp)
a8:  48 8b 45 c0               mov    -0x40(%rbp),%rax
ac:  c7 00 00 20 00 00         movl   $0x2000,(%rax)
b2:  48 8b 45 c8               mov    -0x38(%rbp),%rax
b6:  48 b9 bb bb aa aa 99      movabs $0x88889999aaaabbbb,%rcx
bd:  99 88 88
c0:  48 89 08             mov    %rcx,(%rax)
c3:  48 8d 3d 00 00 00 00      lea    0x0(%rip),%rdi        # ca <main+0xca>
                    c6: R_X86_64_PC32    .rodata-0x4
ca:  e8 00 00 00 00            callq  cf <main+0xcf>
                    cb: R_X86_64_PLT32  puts-0x4
cf:  48 8d 3d 00 00 00 00      lea    0x0(%rip),%rdi        # d6 <main+0xd6>
                    d2: R_X86_64_PC32    .rodata+0x8
d6:  e8 00 00 00 00            callq  db <main+0xdb>
                    d7: R_X86_64_PLT32  puts-0x4
db:  48 8b 45 b0               mov    -0x50(%rbp),%rax
df:  48 89 c6             mov    %rax,%rsi
e2:  48 8d 3d 00 00 00 00      lea    0x0(%rip),%rdi        # e9 <main+0xe9>
                    e5: R_X86_64_PC32    .rodata+0xa
e9:  b8 00 00 00 00            mov    $0x0,%eax
ee:  e8 00 00 00 00            callq  f3 <main+0xf3>
                    ef: R_X86_64_PLT32  printf-0x4
f3:  8b 45 ac             mov    -0x54(%rbp),%eax
f6:  89 c6                mov    %eax,%esi
f8:  48 8d 3d 00 00 00 00      lea    0x0(%rip),%rdi        # ff <main+0xff>
                    fb: R_X86_64_PC32    .rodata+0x14
```

```
 ff:   b8 00 00 00 00            mov    $0x0,%eax
104:  e8 00 00 00 00            callq  109 <main+0x109>
                      105: R_X86_64_PLT32       printf-0x4
109:  8b 45 ac                  mov    -0x54(%rbp),%eax
10c:  89 c6                     mov    %eax,%esi
10e:  48 8d 3d 00 00 00 00      lea    0x0(%rip),%rdi        # 115 <main+0x115>
                      111: R_X86_64_PC32  .rodata+0x1d
115:  b8 00 00 00 00            mov    $0x0,%eax
11a:  e8 00 00 00 00            callq  11f <main+0x11f>
                      11b: R_X86_64_PLT32       printf-0x4
11f:  8b 45 ac                  mov    -0x54(%rbp),%eax
122:  89 c6                     mov    %eax,%esi
124:  48 8d 3d 00 00 00 00      lea    0x0(%rip),%rdi        # 12b <main+0x12b>
                      127: R_X86_64_PC32  .rodata+0x28
12b:  b8 00 00 00 00            mov    $0x0,%eax
130:  e8 00 00 00 00            callq  135 <main+0x135>
                      131: R_X86_64_PLT32       printf-0x4
135:  0f be 45 aa               movsbl -0x56(%rbp),%eax
139:  89 c6                     mov    %eax,%esi
13b:  48 8d 3d 00 00 00 00      lea    0x0(%rip),%rdi        # 142 <main+0x142>
                      13e: R_X86_64_PC32  .rodata+0x32
142:  b8 00 00 00 00            mov    $0x0,%eax
147:  e8 00 00 00 00            callq  14c <main+0x14c>
                      148: R_X86_64_PLT32       printf-0x4
14c:  48 8d 45 d0               lea    -0x30(%rbp),%rax
150:  48 89 c6                  mov    %rax,%rsi
153:  48 8d 3d 00 00 00 00      lea    0x0(%rip),%rdi        # 15a <main+0x15a>
                      156: R_X86_64_PC32  .rodata+0x3b
15a:  b8 00 00 00 00            mov    $0x0,%eax
15f:  e8 00 00 00 00            callq  164 <main+0x164>
                      160: R_X86_64_PLT32       printf-0x4
164:  b8 00 00 00 00            mov    $0x0,%eax
169:  48 8b 55 f8               mov    -0x8(%rbp),%rdx
16d:  64 48 33 14 25 28 00      xor    %fs:0x28,%rdx
174:  00 00
176:  74 05                     je     17d <main+0x17d>
178:  e8 00 00 00 00            callq  17d <main+0x17d>
                      179: R_X86_64_PLT32       __stack_chk_fail-0x4
17d:  c9                        leaveq
```

17e: c3 retq

4.Learn “find” and “grep” commands and show some examples of their usage. Create some dummy directories and data to test these commands.

Find: Search for files and directories based on specified conditions

```
(base) doug@pop-os:~/grad/cosc519/hw1$ find ./ -name hello*
./first/hello.s
./first/hello.o
./first/hello
./first/hello.c
./first/hello.lst
./first/hello.map
```

```
(base) doug@pop-os:~/grad/cosc519/hw1/data$ find ./ -type f ! -perm 777
./hw1.txt
./newhw1.txt
./new_file.txt
```

Grep: Search files for specified character patterns

```
(base) doug@pop-os:~/grad/cosc519/hw1/data$ grep -i "a" -in *.txt
new_file.txt:1:apples
new_file.txt:2:bananas
new_file.txt:3:oranges
test1.txt:1:apples
test1.txt:2:bananas
test1.txt:3:oranges
```

```
(base) doug@pop-os:~/grad/cosc519/hw1/data$ grep -c "o" -in new_file.txt
1
```

```
(base) doug@pop-os:~/grad/cosc519/hw1/data$ grep -w "oranges"  new_file.txt
oranges
```

5.Write a small Linux shell program or get any sample from the Web and run it and show the results. Include your shell program and results with the homework (a reasonable size shell program).

save_sum.sh:

```
#! /bin/bash
: '
The following script sums two numbers, prints the result and saves it to a file
```

'

```
#Add two numbers
a=17
b=5
((sum=a+b))

#Print to screen
echo "The Sum of " $a "and" $b "is" $sum

#save to file
tee sumfile.txt <<< $sum
```

Output:

```
(base) doug@pop-os:~/grad/cosc519/hw1$ ./save_sum.sh
The Sum of  17 and 5 is 22
22
22
```