

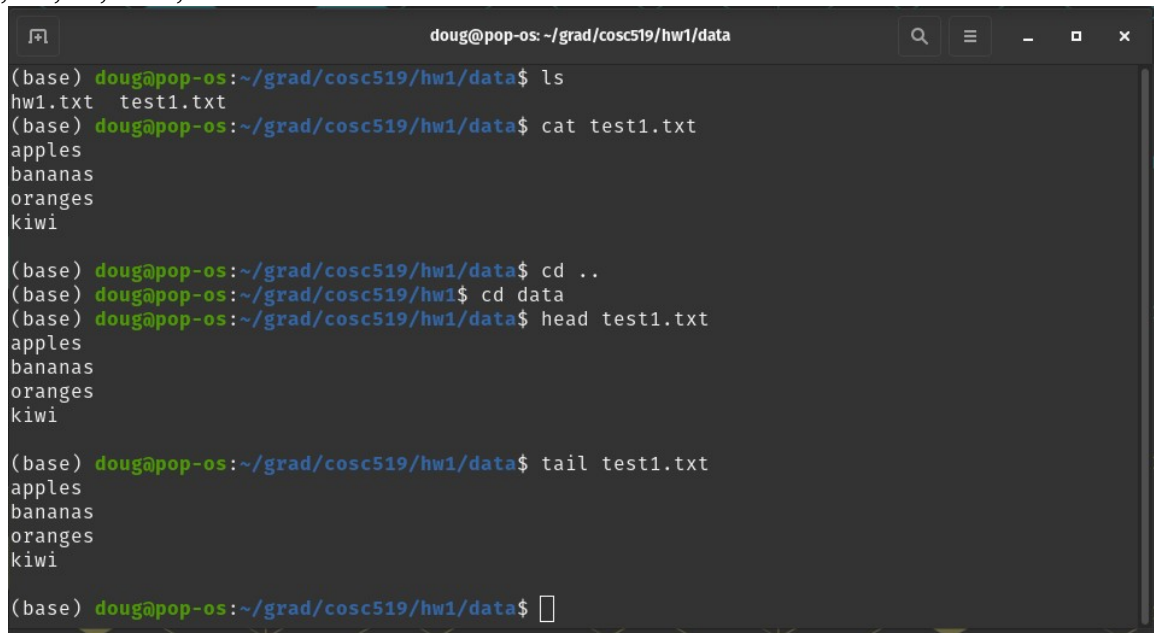
Doug Branton
COSC 519
Homework 1

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.

1-5. ls, cat, cd, head, tail

A terminal window titled 'doug@pop-os: ~/grad/cosc519/hw1/data' with search, menu, and window control icons in the title bar. The terminal shows a series of commands and their outputs. The prompt is '(base) doug@pop-os:~/grad/cosc519/hw1/data\$'. The commands and outputs are: 'ls' showing 'hw1.txt test1.txt'; 'cat test1.txt' showing 'apples', 'bananas', 'oranges', 'kiwi'; 'cd ..' and 'cd data' changing directories; 'head test1.txt' and 'tail test1.txt' both showing the same list of fruits. The terminal ends with a blank prompt line.

```
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt  test1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ cat test1.txt
apples
bananas
oranges
kiwi
(base) doug@pop-os:~/grad/cosc519/hw1/data$ cd ..
(base) doug@pop-os:~/grad/cosc519/hw1$ cd data
(base) doug@pop-os:~/grad/cosc519/hw1/data$ head test1.txt
apples
bananas
oranges
kiwi
(base) doug@pop-os:~/grad/cosc519/hw1/data$ tail test1.txt
apples
bananas
oranges
kiwi
(base) doug@pop-os:~/grad/cosc519/hw1/data$
```

6-20: mkdir, pwd, mv, rm, touch, cp, id, who, w, ps, uname, uptime, hostname, date, last

```
Activities Terminal Fri Sep 17 6:08 PM
doug@pop-os: ~/grad/cosc519/hw1/data

(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt test1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ mkdir test
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt test test1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ pwd
/home/doug/grad/cosc519/hw1/data
(base) doug@pop-os:~/grad/cosc519/hw1/data$ mv test test1
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt test1 test1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ rm -r test1
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt test1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ touch new_file.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt new_file.txt test1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ cp test1.txt new_file.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ cat new_file.txt
apples
bananas
oranges
kiwi

(base) doug@pop-os:~/grad/cosc519/hw1/data$ id
uid=1000(doug) gid=1000(doug) groups=1000(doug),4(adm),27(sudo)
(base) doug@pop-os:~/grad/cosc519/hw1/data$ who
doug      :1      2021-08-31 15:23 (:1)
(base) doug@pop-os:~/grad/cosc519/hw1/data$ w
18:04:49 up 17 days,  2:41,  1 user,  load average: 0.66, 0.64, 0.76
USER      TTY      FROM          LOGIN@   IDLE   JCPU   PCPU   WHAT
doug      :1      :1            31Aug21 ?xdm?   1:20m   0.01s  /usr/lib/gdm3/gdm-x-session --run-script env GNOME_SHELL_SESSION_MODE=pop /usr/bin/gnome-session --systemd --session=pop
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ps
  PID TTY          TIME CMD
  5968 pts/0    00:00:00 bash
  59204 pts/0    00:00:00 ps
(base) doug@pop-os:~/grad/cosc519/hw1/data$ uname
Linux
(base) doug@pop-os:~/grad/cosc519/hw1/data$ uptime
18:07:04 up 17 days,  2:43,  1 user,  load average: 0.47, 0.60, 0.72
(base) doug@pop-os:~/grad/cosc519/hw1/data$ hostname
pop-os
(base) doug@pop-os:~/grad/cosc519/hw1/data$ date
Fri 17 Sep 2021 06:07:46 PM EDT
(base) doug@pop-os:~/grad/cosc519/hw1/data$ last reboot
reboot system boot 5.11.0-7614-gene Tue Aug 31 15:23 still running
reboot system boot 5.11.0-7614-gene Mon Aug  9 19:13 still running
reboot system boot 5.11.0-7614-gene Mon Jul 19 19:35 still running
reboot system boot 5.11.0-7614-gene Thu Jul 15 17:43 still running
reboot system boot 5.11.0-7614-gene Sun Jul 11 20:07 still running
reboot system boot 5.11.0-7614-gene Sun Jun 20 12:44 still running
```

21-26: chmod, cal, whoami, df, sudo, fdisk

```
Activities Terminal Fri Sep 17 6:15 PM
doug@pop-os: ~/grad/cosc519/hw1/data

(base) doug@pop-os:~/grad/cosc519/hw1/data$ chmod g-x *
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt new_file.txt test1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ 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

(base) doug@pop-os:~/grad/cosc519/hw1/data$ whoami
doug
(base) doug@pop-os:~/grad/cosc519/hw1/data$ df
Filesystem      1K-blocks      Used Available Use% Mounted on
udev            3963368         0   3963368   0% /dev
tmpfs           803144       2232    800912   1% /run
/dev/nvme0n1p3 470908196 31074388 415843228   7% /
tmpfs           4015708     19284   3996424   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/1100
tmpfs           803140       116    803024   1% /run/user/1000
(base) doug@pop-os:~/grad/cosc519/hw1/data$ 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    1023098    1019993   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
(base) doug@pop-os:~/grad/cosc519/hw1/data$
```

27-30: netstat, ifconfig, cmp, comm

```
Activities Terminal Sun Sep 19 8:35 PM
doug@pop-os: ~/grad/cosc519/hw1/data

(base) doug@pop-os:~/grad/cosc519/hw1/data$ netstat -nulp
(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 0.0.0.0:53:53          0.0.0.0:*               LISTEN      -
tcp        0      0 0.0.0.0:1:631         0.0.0.0:*               LISTEN      -
tcp        0      0 0.0.0.0:1:38463       0.0.0.0:*               LISTEN      2630/expressvpn-age
tcp        0      0 0.0.0.0:1:2015        0.0.0.0:*               LISTEN      -
tcp        0      0 0.0.0.0:1:44773       0.0.0.0:*               LISTEN      44946/expressvpn-br
tcp6       0      0 :::1:631              :::*                    LISTEN      -
udp        0      0 0.0.0.0:40201         0.0.0.0:*               -           -
udp        0      0 0.0.0.0:53:53         0.0.0.0:*               -           -
udp        0      0 0.0.0.0:631          0.0.0.0:*               -           -
udp        0      0 0.0.0.0:5353          0.0.0.0:*               -           -
udp6       0      0 :::40066              :::*                    -           -
udp6       0      0 :::5353               :::*                    -           -

(base) doug@pop-os:~/grad/cosc519/hw1/data$ 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 135269 bytes 38328336 (38.3 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 135269 bytes 38328336 (38.3 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlp58s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.86.25 netmask 255.255.255.0 broadcast 192.168.86.255
    inet6 fe80::4ce8:81ba:b60d:509a prefixlen 64 scopeid 0x20<link>
    ether 9c:b6:d0:01:91 txqueuelen 1000 (Ethernet)
    RX packets 1527507 bytes 1978501461 (1.9 GB)
    RX errors 0 dropped 66 overruns 0 frame 0
    TX packets 397568 bytes 83792932 (83.7 MB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

(base) doug@pop-os:~/grad/cosc519/hw1/data$ cmp new_file.txt hw1.txt
new_file.txt hw1.txt differ: byte 1, line 1
(base) doug@pop-os:~/grad/cosc519/hw1/data$ comm new_file.txt hw1.txt
apples
bananas
    hw1.txt
oranges
comm: file 1 is not in sorted order
kiwi

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

31-39: diff, dir, diff3, dircolors, dirs, du, file, gzip, gunzip

```
Activities Terminal Sun Sep 19 8:42 PM
doug@pop-os: ~/grad/cosc519/hw1/data

(base) doug@pop-os:~/grad/cosc519/hw1/data$ diff hw1.txt new_file.txt
1,2c1,5
< hw1.txt
< test1.txt
---
> apples
> bananas
> oranges
> kiwi
>

(base) doug@pop-os:~/grad/cosc519/hw1/data$ dir
hw1.txt new_file.txt test1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ diff3 hw1.txt new_file.txt test1.txt
====1
1:1,2c
    hw1.txt
    test1.txt
2:1,5c
3:1,5c
    apples
    bananas
    oranges
    kiwi

(base) doug@pop-os:~/grad/cosc519/hw1/data$ 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;01: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;31;*.tgz=01;31;*.arc=01;31;*.arj=01;31;*.taz=01;31;*.lha=01;31;*.lzh=01;31;*.lzm=01;31;*.tlz=01;31;*.txz=01;31;*.tzo=01;31;*.t7z=01;31;*.zip=01;31;*.z=01;31;*.dz=01;31;*.gz=01;31;*.lrz=01;31;*.lz=01;31;*.lzo=01;31;*.xz=01;31;*.zst=01;31;*.tzt=01;31;*.bz2=01;31;*.bz=01;31;*.tbz=01;31;*.tbz2=01;31;*.taz=01;31;*.deb=01;31;*.rpm=01;31;*.jar=01;31;*.war=01;31;*.ear=01;31;*.sar=01;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;*.gif=01;35;*.bmp=01;35;*.pbm=01;35;*.pgm=01;35;*.tga=01;35;*.xpm=01;35;*.tif=01;35;*.tiff=01;35;*.png=01;35;*.svg=01;35;*.svgz=01;35;*.mng=01;35;*.pcx=01;35;*.mov=01;35;*.mpg=01;35;*.mpeg=01;35;*.m2v=01;35;*.mkv=01;35;*.webm=01;35;*.ogm=01;35;*.mp4=01;35;*.m4v=01;35;*.mpqv=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;*.wd=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
(base) doug@pop-os:~/grad/cosc519/hw1/data$ dirs
~/grad/cosc519/hw1/data
(base) doug@pop-os:~/grad/cosc519/hw1/data$ du
10
.
(base) doug@pop-os:~/grad/cosc519/hw1/data$ file hw1.txt
hw1.txt: ASCII text
(base) doug@pop-os:~/grad/cosc519/hw1/data$ gzip hw1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt.gz new_file.txt test1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ gunzip hw1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt new_file.txt test1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$
```

40-50: logname, nl, rev, scp, sort, sum, type, tty, which, !, vmstat

```
Activities Terminal Sun Sep 19 8:55 PM
doug@pop-os: ~/grad/cosc519/hw1/data
(base) doug@pop-os:~/grad/cosc519/hw1/data$ logname
doug
(base) doug@pop-os:~/grad/cosc519/hw1/data$ nl test1.txt
1 apples
2 bananas
3 oranges
4 kiwi
(base) doug@pop-os:~/grad/cosc519/hw1/data$ rev hw1.txt
txt.lwh
txt.itset
txt.itset
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt new_file.txt test1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ scp hw1.txt newhw1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ ls
hw1.txt new_file.txt newhw1.txt test1.txt
(base) doug@pop-os:~/grad/cosc519/hw1/data$ sort new_file.txt
apples
bananas
kiwi
oranges
(base) doug@pop-os:~/grad/cosc519/hw1/data$ sum hw1.txt
23399 1
(base) doug@pop-os:~/grad/cosc519/hw1/data$ type mv
mv is hashed (/usr/bin/mv)
(base) doug@pop-os:~/grad/cosc519/hw1/data$ tty
/dev/pts/0
(base) doug@pop-os:~/grad/cosc519/hw1/data$ which ls
/usr/bin/ls
(base) doug@pop-os:~/grad/cosc519/hw1/data$ !!
which ls
/usr/bin/ls
(base) doug@pop-os:~/grad/cosc519/hw1/data$ vmstat
procs-----memory-----swap-- --io-- --system-- --cpu-----
r b swpd free buff cache si so bi bo in cs us sy id wa st
0 0 1021680 1909112 261732 1954456 3 30 80 108 172 39 13 4 83 0 0
(base) doug@pop-os:~/grad/cosc519/hw1/data$
```

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

```
Activities Terminal Sun Sep 19 9:06 PM
doug@pop-os: ~/grad/cosc519/hw1/first
(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-
0240 7838362d 36342f63 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 ad6852ae .....h.R.
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 61630b5f 630b0b5f 6661006c _stack_chk_fail
03c8 00707269 6e746600 6d616c6c 6f63005f _printf_mallo
03d8 5f637861 5f66696e 616c697a 65005f5f _cxa_finalize.
03e8 6c696263 5f737461 72745f6d 61096e00 libc_start_mai
03f8 474c4942 435f322e 3400474c 4942435f GLIBC_2.4.GLIBC
0408 322e322e 35005f49 544d5f64 65726567 2.2.5._ITM_dere
0418 69737465 72544d43 6c0f6e65 5461626c isterTMCloneTabl
0428 65005f5f 676d0f6e 5f737461 72745f5f e___gmon_start_
0438 005f0954 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 .....
```

[Results truncated]

```

Activities Terminal Sun Sep 19 9:07 PM
doug@pop-os: ~/grad/cosc519/hw1/first
(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 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 00 movq $0x0,-0x20(%rbp)
50: 00
51: 48 c7 45 e8 00 00 00 00 movq $0x0,-0x18(%rbp)
58: 00
59: 48 c7 45 f0 00 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 d0       mov %rax,-0x50(%rbp)

```

[Results Truncated]

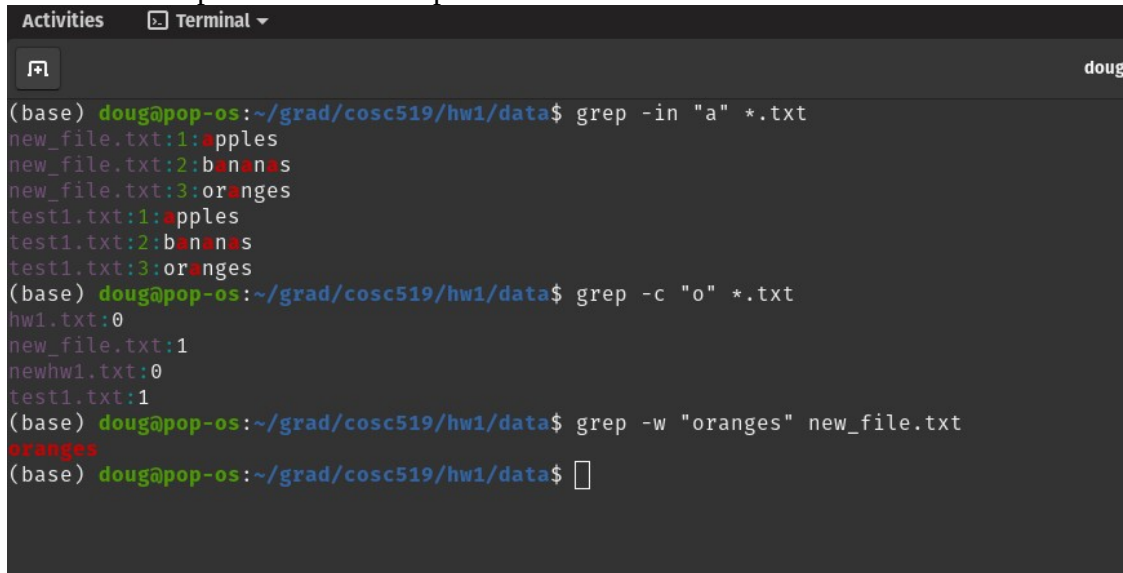
4. Learn “find” and “grep” commands and show some examples of their usage. Create some dummy directories and data to test these commands. Find: Search for files and directories based on specified conditions

```

Activities Terminal
doug@pop-os: ~/grad/cosc519/hw1
(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$ find ./ -name *.txt
./data/hw1.txt
./data/newhw1.txt
./data/test1.txt
./data/new_file.txt
(base) doug@pop-os:~/grad/cosc519/hw1$ find ./ -type f ! -perm 777
./hw1_1.png
./first.7z
./~lock.branton_hw1.odt#
./data/hw1.txt
./data/newhw1.txt
./data/new_file.txt
./first/cln.sh
./first/hello.s
./first/hello.o
./first/hello
./first/hello.c
./first/c.sh
./first/c.shtxt
./first/hello.lst
./first/hello.map
./branton_hw1.odt
(base) doug@pop-os:~/grad/cosc519/hw1$

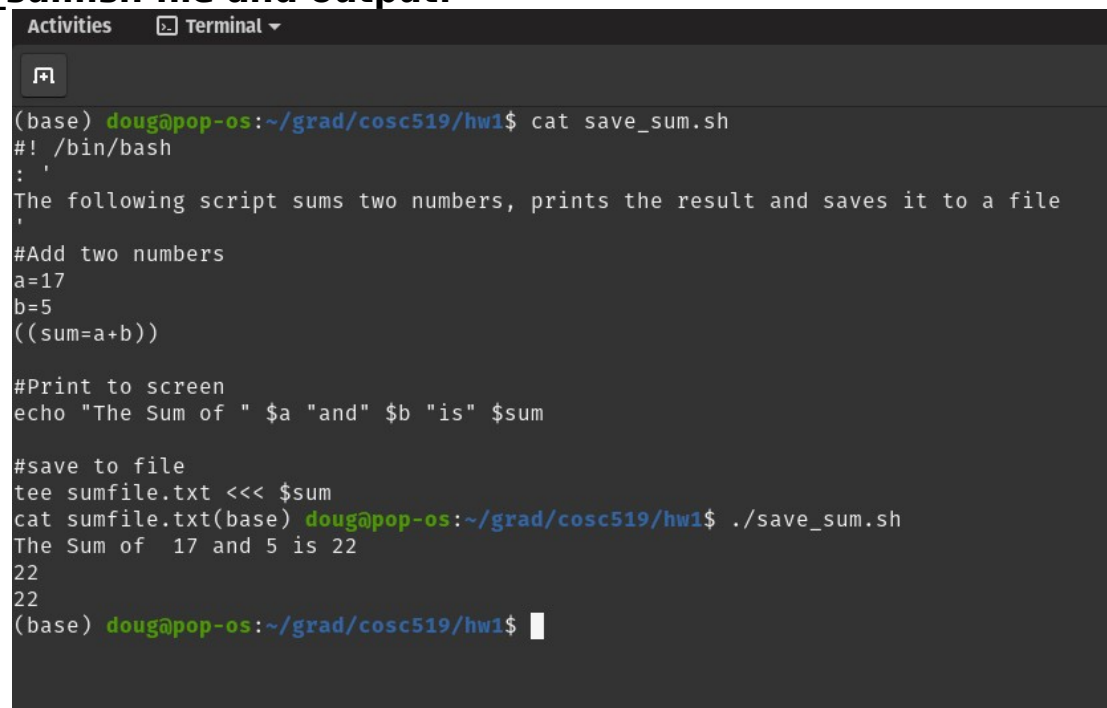
```

Grep: Search files for specified character patterns

A terminal window titled 'Terminal' with a user icon and the name 'doug'. The prompt is '(base) doug@pop-os:~/grad/cosc519/hw1/data\$'. The user enters 'grep -in "a" *.txt', and the output shows 'new_file.txt:1:apples', 'new_file.txt:2:bananas', 'new_file.txt:3:oranges', 'test1.txt:1:apples', 'test1.txt:2:bananas', and 'test1.txt:3:oranges'. The user then enters 'grep -c "o" *.txt', and the output shows 'hw1.txt:0', 'new_file.txt:1', 'newhw1.txt:0', and 'test1.txt:1'. Finally, the user enters 'grep -w "oranges" new_file.txt', and the output shows 'oranges'. The prompt returns to '(base) doug@pop-os:~/grad/cosc519/hw1/data\$'.

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 file and output:

A terminal window titled 'Terminal' with a user icon and the name 'doug'. The prompt is '(base) doug@pop-os:~/grad/cosc519/hw1\$'. The user enters 'cat save_sum.sh', and the output shows the contents of the script: '#!/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', and 'cat sumfile.txt'. The user then enters './save_sum.sh', and the output shows 'The Sum of 17 and 5 is 22' and '22'. The prompt returns to '(base) doug@pop-os:~/grad/cosc519/hw1\$'.