

LAB 4: Unixland

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To say there are a lot of commands in Unixland is an understatement. To view your PATH, type:

```
% echo $PATH
```

When you type **ls**, your PATH environment variable is used to locate the **ls** executable command to run. The commands in the PATH can be binary executables or executable shell scripts.

On my system, there are 40 directories defined in my PATH which are searched in order. The first 9 directories found in the \$PATH are listed below:

```
/usr/local/sbin  
/usr/local/bin  
/usr/sbin  
/usr/bin  
/sbin  
/bin  
  
/usr/games  
/usr/local/games  
/mnt/c/Program
```

As seen above, Unix will first search for and use **/usr/local/bin/ls** if found, next **/usr/local/bin/ls** is searched for, **/usr/sbin/ls**, and finally **/usr/bin/ls**, which is where the **ls** command executable actually resides.

We can check this by running:

```
john@oho:~$ ls -l /usr/local/sbin/ls /usr/local/bin/ls /usr/sbin/ls /usr/bin/ls  
ls: cannot access '/usr/local/sbin/ls': No such file or directory  
ls: cannot access '/usr/local/bin/ls': No such file or directory  
ls: cannot access '/usr/sbin/ls': No such file or directory  
-rwxr-xr-x 1 root root 142144 Sep 5 2019 /usr/bin/ls
```

So, when you type the **ls** command, the executable you are running is found in the **/usr/bin/ls** directory. The **which** command tells us the location of the **ls** command that is used.

```
john@oho:~$ which ls  
/usr/bin/ls
```

There can be multiple **ls** commands found in the different PATH directories. The first **ls** command found in the PATH is used. A hacker could place a **ls** script in /usr/local/sbin directory if they somehow had access rights to do so, which would run using the user's permissions to do some dastardly deed and then run /usr/bin/ls to show the output the user expected. This is why if you want to add your current directory to your PATH variable, it should be the very last directory searched by adding the '.' character to your PATH, which represents your current directory.

There are 1079 binary files found in the /bin directory alone. Don't worry, we don't need to learn them all!

```
john@oho:~$ ls /bin | wc -l
1079
```

The more common Unix commands are provided below.

Unixland Exercise

To start this exercise, you need to first create two files: hi.txt and hello.txt.

hello.txt contains two lines: Hello and Bye. hi.txt contains two lines: Hi and Bye.

The commands to type and learn more about are bolded below.

```
john@comp232:~$ mkdir unixland
```

```
john@comp232:~$ cd unixland
```

```
john@comp232:~/unixland$ vi hello.txt
```

← hello.txt contains two lines: Hello and Bye.

```
john@comp232:~/unixland$ vi hi.txt
```

← hi.txt contains two lines: Hi and Bye.

```
john@comp232:~/unixland$ script unixland.txt
Script started, output log file is 'unixland.txt'.
```

← **VERY IMPORTANT TO RECORD YOUR SESSION**

Make sure you typed "script unixland.txt" above to record your work!!!

The script command records what you type into file unixland.txt.

```
john@comp232:~/unixland$ ls -l
total 8
-rw-rw-r-- 1 john john 10 Aug 22 15:38 hello.txt
-rw-rw-r-- 1 john john  7 Aug 22 15:39 hi.txt
-rw-rw-r-- 1 john john  0 Aug 22 15:39 unixland.txt
```

```
john@comp232:~/unixland$ more hello.txt
Hello
Bye
```

```
john@comp232:~/unixland$ more hi.txt
```

```
Hi
```

```
Bye
```

arch

```
john@comp232:~/unixland$ arch
```

```
x86_64
```

cal

```
john@comp232:~/unixland$ cal
```

```
September 2025
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
```

```
john@comp232:~/unixland$ cal 2025
```

```

2025
January February March
Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa
    1  2  3  4          1          1
  5  6  7  8  9 10 11  2  3  4  5  6  7  8  2  3  4  5  6  7  8
12 13 14 15 16 17 18  9 10 11 12 13 14 15  9 10 11 12 13 14 15
19 20 21 22 23 24 25 16 17 18 19 20 21 22 16 17 18 19 20 21 22
26 27 28 29 30 31    23 24 25 26 27 28    23 24 25 26 27 28 29
                                   30 31

April May June
Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa
    1  2  3  4  5          1  2  3  1  2  3  4  5  6  7
  6  7  8  9 10 11 12  4  5  6  7  8  9 10  8  9 10 11 12 13 14
13 14 15 16 17 18 19 11 12 13 14 15 16 17 15 16 17 18 19 20 21
20 21 22 23 24 25 26 18 19 20 21 22 23 24 22 23 24 25 26 27 28
27 28 29 30    25 26 27 28 29 30 31 29 30

July August September
Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa
    1  2  3  4  5          1  2          1  2  3  4  5  6
  6  7  8  9 10 11 12  3  4  5  6  7  8  9  7  8  9 10 11 12 13
13 14 15 16 17 18 19 10 11 12 13 14 15 16 14 15 16 17 18 19 20
20 21 22 23 24 25 26 17 18 19 20 21 22 23 21 22 23 24 25 26 27
27 28 29 30 31    24 25 26 27 28 29 30 28 29 30
31
```

October							November							December						
Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4							1		1	2	3	4	5	6
5	6	7	8	9	10	11	2	3	4	5	6	7	8	7	8	9	10	11	12	13
12	13	14	15	16	17	18	9	10	11	12	13	14	15	14	15	16	17	18	19	20
19	20	21	22	23	24	25	16	17	18	19	20	21	22	21	22	23	24	25	26	27
26	27	28	29	30	31		23	24	25	26	27	28	29	28	29	30	31			
							30													

cat

```
john@comp232:~/unixland$ cat hi.txt
```

Hi

Bye

```
john@comp232:~/unixland$ cat hi.txt hello.txt
```

Hi

Bye

Hello

Bye

```
john@comp232:~/unixland$ cat hi.txt hello.txt > both.txt
```

```
john@comp232:~/unixland$ cat both.txt
```

Hi

Bye

Hello

Bye

```
john@comp232:~/unixland$ ls -l
```

total 12

-rw-rw-r-- 1 john john 17 Aug 22 15:43 both.txt

-rw-rw-r-- 1 john john 10 Aug 22 15:38 hello.txt

-rw-rw-r-- 1 john john 7 Aug 22 15:39 hi.txt

-rw-rw-r-- 1 john john 0 Aug 22 15:39 unixland.txt

chgrp

```
john@comp232:~/unixland$ grep netdev /etc/group
```

netdev:x:117:

```
john@comp232:~/unixland$ chgrp netdev both.txt
```

chgrp: changing group of 'both.txt': Operation not permitted

chmod

```
john@comp232:~/unixland$ chmod 000 both.txt
```

```
john@comp232:~/unixland$ more both.txt
more: cannot open both.txt: Permission denied
```

```
john@comp232:~/unixland$ ls -l both.txt
----- 1 john john 17 Aug 22 15:43 both.txt
```

```
john@comp232:~/unixland$ chmod 400 both.txt
```

```
john@comp232:~/unixland$ ls -l both.txt
-r----- 1 john john 17 Aug 22 15:43 both.txt
```

```
john@comp232:~/unixland$ more both.txt
Hi
Bye
Hello
Bye
```

```
john@comp232:~/unixland$ chmod 644 both.txt
```

```
john@comp232:~/unixland$ ls -l both.txt
-rw-r--r-- 1 john john 17 Aug 22 15:43 both.txt
```

```
john@comp232:~/unixland$ more both.txt
Hi
Bye
Hello
Bye
```

```
john@comp232:~/unixland$ mkdir mydir
```

```
john@comp232:~/unixland$ ls -ld mydir
drwxrwxr-x 2 john john 4096 Aug 22 15:46 mydir
```

```
john@comp232:~/unixland$ chmod 750 mydir
```

```
john@comp232:~/unixland$ ls -ld mydir
drwxr-x--- 2 john john 4096 Aug 22 15:46 mydir
```

```
john@comp232:~/unixland$ cd mydir
```

```
john@comp232:~/unixland/mydir$ touch test.txt
```

```
john@comp232:~/unixland/mydir$ ls -l
total 0
-rw-rw-r-- 1 john john 0 Aug 22 15:47 test.txt
```

```
john@comp232:~/unixland/mydir$ cd ..
```

```
john@comp232:~/unixland$ ls -l
total 20
-rw-r--r-- 1 john john 17 Aug 22 15:43 both.txt
-rw-rw-r-- 1 john john 10 Aug 22 15:38 hello.txt
-rw-rw-r-- 1 john john 7 Aug 22 15:39 hi.txt
drwxr-x--- 2 john john 4096 Aug 22 15:48 mydir
-rw-rw-r-- 1 john john 4096 Aug 22 15:47 unixland.txt
```

```
john@comp232:~/unixland$ chmod 644 mydir
```

```
john@comp232:~/unixland$ ls -ld mydir
drw-r--r-- 2 john john 4096 Aug 22 15:48 mydir
```

```
john@comp232:~/unixland$ cd mydir
bash: cd: mydir: Permission denied
```

```
john@comp232:~/unixland$ chmod 700 mydir
```

```
john@comp232:~/unixland$ ls -ld mydir
drwx----- 2 john john 4096 Aug 22 15:48 mydir
```

```
john@comp232:~/unixland$ ls -l mydir
total 0
-rw-rw-r-- 1 john john 0 Aug 22 15:47 test.txt
```

```
john@comp232:~/unixland$ ls -l
total 20
-rw-r--r-- 1 john john 17 Aug 22 15:43 both.txt
-rw-rw-r-- 1 john john 10 Aug 22 15:38 hello.txt
-rw-rw-r-- 1 john john 7 Aug 22 15:39 hi.txt
drwx----- 2 john john 4096 Aug 22 15:48 mydir
-rw-rw-r-- 1 john john 4096 Aug 22 15:47 unixland.txt
```

```
john@comp232:~/unixland$ chmod 500 mydir
```

```
john@comp232:~/unixland$ ls -ld mydir
dr-x----- 2 john john 4096 Aug 22 15:48 mydir
```

```
john@comp232:~/unixland$ cd mydir
```

```
john@comp232:~/unixland/mydir$ touch texas.txt
touch: cannot touch 'texas.txt': Permission denied
```

```
john@comp232:~/unixland/mydir$ cd ..
```

```
john@comp232:~/unixland$ ls -ld mydir
dr-x----- 2 john john 4096 Aug 22 15:48 mydir
```

```
john@comp232:~/unixland$ chmod 750 mydir
```

```
john@comp232:~/unixland$ ls -ld mydir
drwxr-x--- 2 john john 4096 Aug 22 15:48 mydir
```

```
john@comp232:~/unixland$ cd mydir
```

```
john@comp232:~/unixland/mydir$ touch texas.txt
```

```
john@comp232:~/unixland/mydir$ ls -l
total 0
-rw-rw-r-- 1 john john 0 Aug 22 15:47 test.txt
-rw-rw-r-- 1 john john 0 Aug 22 15:51 texas.txt
```

```
john@comp232:~/unixland/mydir$ cd ..
```

```
john@comp232:~/unixland$ pwd
/home/JOHN/unixland
```

compress

```
john@comp232:~/unixland$ cp /etc/passwd .
```

← Don't forget the dot!

```
john@comp232:~/unixland$ ls -l
total 52
-rw-r--r-- 1 john john 17 Aug 22 15:43 both.txt
-rw-rw-r-- 1 john john 10 Aug 22 15:38 hello.txt
-rw-rw-r-- 1 john john 7 Aug 22 15:39 hi.txt
drwxr-x--- 2 john john 4096 Aug 22 15:51 mydir
-rw-r--r-- 1 john john 18719 Aug 22 15:57 passwd
-rw-rw-r-- 1 john john 16384 Aug 22 15:57 unixland.txt
```

```
john@comp232:~/unixland$ compress passwd
```

```
john@comp232:~/unixland$ ls -l
total 32
-rw-r--r-- 1 john john 17 Aug 22 17:53 both.txt
-rw-rw-r-- 1 john john 10 Aug 22 17:47 hello.txt
-rw-rw-r-- 1 john john 7 Aug 22 17:47 hi.txt
drwxr-x--- 2 john john 4096 Aug 22 17:59 mydir
-rw-r--r-- 1 john john 7990 Aug 22 18:00 passwd.Z
-rw-rw-r-- 1 john john 8192 Aug 22 17:59 unixland.txt
```

```
john@comp232:~/unixland$ ls -l passwd.Z
```

```
-rw-r--r-- 1 john john 7990 Aug 22 15:57 passwd.Z
```

← File is now compressed.

```
john@comp232:~/unixland$ gunzip passwd.Z
```

```
john@comp232:~/unixland$ ls -l passwd /etc/passwd
```

```
-rw-r--r-- 1 root root 18719 Jul 24 16:23 /etc/passwd
```

```
-rw-r--r-- 1 john john 18719 Aug 22 15:57 passwd
```

date

```
john@comp232:~/unixland$ date
```

```
Fri Aug 22 16:51:44 PDT 2025
```

```
john@comp232:~/unixland$ date '+%m/%d/%Y'
```

```
08/22/2025
```

```
john@comp232:~/unixland$ date '+%I:%M %p'
```

```
04:59 PM
```

```
john@comp232:~/unixland$ date '+%H:%M'
```

```
16:54
```

```
john@comp232:~/unixland$ date '+%A %B %d, %Y'
```

```
Friday August 22, 2025
```

df

```
john@comp232:~/unixland$ df
```

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
tmpfs	201540	1200	200340	1%	/run
/dev/vda1	50620216	25781812	24822020	51%	/
tmpfs	1007688	4	1007684	1%	/dev/shm
tmpfs	5120	0	5120	0%	/run/lock
/dev/vda15	106858	6246	100613	6%	/boot/efi
tmpfs	201536	16	201520	1%	/run/user/1209
tmpfs	201536	16	201520	1%	/run/user/1213
tmpfs	201536	16	201520	1%	/run/user/0

```
tmpfs                201536          16    201520    1% /run/user/1026
```

```
john@comp232:~/unixland$ df -kh
```

Filesystem	Size	Used	Avail	Use%	Mounted on
tmpfs	197M	1.2M	196M	1%	/run
/dev/vda1	49G	25G	24G	51%	/
tmpfs	985M	4.0K	985M	1%	/dev/shm
tmpfs	5.0M	0	5.0M	0%	/run/lock
/dev/vda15	105M	6.1M	99M	6%	/boot/efi
tmpfs	197M	16K	197M	1%	/run/user/1209
tmpfs	197M	16K	197M	1%	/run/user/1213
tmpfs	197M	16K	197M	1%	/run/user/0
tmpfs	197M	16K	197M	1%	/run/user/1026

diff

```
john@comp232:~/unixland$ ls -l
```

```
total 24
```

```
-rw-r--r-- 1 john john 17 Aug 22 15:43 both.txt
-rw-rw-r-- 1 john john 10 Aug 22 15:38 hello.txt
-rw-rw-r-- 1 john john 7 Aug 22 15:39 hi.txt
drwxr-x--- 2 john john 4096 Aug 22 15:51 mydir
-rw-rw-r-- 1 john john 8192 Aug 22 15:52 unixland.txt
```

```
john@comp232:~/unixland$ diff hi.txt hello.txt
```

```
1c1
```

```
< Hi
```

```
---
```

```
> Hello
```

```
john@comp232:~/unixland$ diff passwd /etc/passwd
```

du

```
john@comp232:~/unixland$ ls -l hello.txt
```

```
-rw-rw-r-- 1 john john 10 Aug 22 15:38 hello.txt
```

```
john@comp232:~/unixland$ du hello.txt
```

```
4    hello.txt
```

env

```
john@comp232:~/unixland$ env
```

```
SHELL=/bin/bash
```

```
PWD=/home/JOHN/unixland
```

```
LOGNAME=john
```

```
HOME=/home/JOHN
```

```
LANG=C.UTF-8
TERM=xterm-256color
USER=john
SHLVL=2
DEBUGINFOD_URLS=https://debuginfod.ubuntu.com
XDG_DATA_DIRS=/usr/local/share:/usr/share:/var/lib/snapd/desktop
PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin:...
MAIL=/var/mail/john
OLDPWD=/home/JOHN
_=/usr/bin/env
```

```
john@comp232:~/unixland$ env|grep SHELL
SHELL=/bin/bash
```

```
john@comp232:~/unixland$ env|grep USER
USER=john
```

```
john@comp232:~/unixland$ echo $USER
john
```

file

```
john@comp232:~/unixland$ file /bin/ls
/bin/ls: ELF 64-bit LSB pie executable, x86-64, version 1 (SYSV), dynamically linked, interpreter /lib64/ld-linux-x86-64.so.2, BuildID[sha1]=3eca7e3905b37d48cf0a88b576faa7b95cc3097b, for GNU/Linux 3.2.0, stripped
```

```
john@comp232:~/unixland$ file /bin/df
/bin/df: ELF 64-bit LSB pie executable, x86-64, version 1 (SYSV), dynamically linked, interpreter /lib64/ld-linux-x86-64.so.2, BuildID[sha1]=1b26e20155ac9e89284165d0c5cefcdba91f5dff, for GNU/Linux 3.2.0, stripped
```

```
john@comp232:~/unixland$ file *.txt
both.txt:  ASCII text
hello.txt: ASCII text
hi.txt:    ASCII text
unixland.txt: ASCII text, with CRLF, CR, LF line terminators, with escape sequences, with overstriking
```

find

```
john@comp232:~/unixland$ find . -name texas.txt -print
./mydir/texas.txt
```

```
john@comp232:~/unixland$ find /usr -name stdio.h -print
/usr/include/stdio.h
/usr/include/x86_64-linux-gnu/bits/stdio.h
```

gcc, gdb, git, ls

```
john@comp232:~/unixland$ gcc --version
gcc (Ubuntu 13.3.0-6ubuntu2~24.04) 13.3.0
Copyright (C) 2023 Free Software Foundation, Inc.
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

```
john@comp232:~/unixland$ gdb --version
GNU gdb (Ubuntu 15.0.50.20240403-0ubuntu1) 15.0.50.20240403-git
Copyright (C) 2024 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.
```

```
john@comp232:~/unixland$ git --version
git version 2.43.0
```

```
john@comp232:~/unixland$ ls --version
ls (GNU coreutils) 9.4
Copyright (C) 2023 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <https://gnu.org/licenses/gpl.html>.
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.
```

Written by Richard M. Stallman and David MacKenzie.

grep

```
john@comp232:~/unixland$ grep dave /etc/passwd
```

```
john@comp232:~/unixland$ grep ian /etc/passwd
brian2:x:1073:1073:Brian Becerra:/home/brian2:/bin/bash
eric2:x:1114:1114:Eric Kachikian,,,:/home/eric:/bin/bash
brian3:x:1129:1127:Brian Becerra,,,:/home/brian:/bin/bash
brian:x:1133:1132:Brian Becerra,,,:/home/brian:/bin/bash
noah2:x:1158:1157:Noah Soriano,,,:/home/noah:/bin/bash
jiankai:x:1168:1167:Jiankai Zhong,,,:/home/jiankai:/bin/bash
julian:x:1189:1188:Julian Nemo,,,:/home/julian:/bin/bash
christian:x:1238:1238:Christian Mason,,,:/home/christian:/bin/bash
ian:x:1248:1248:Ian Píala,,,:/home/ian:/bin/bash
```

```
john@comp232:~/unixland$ ifconfig -a
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 143.198.238.179 netmask 255.255.240.0 broadcast 143.198.239.255
    inet6 fe80::a8ab:8ff:fedc:eb88 prefixlen 64 scopeid 0x20<link>
    ether aa:ab:08:de:eb:88 txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 10.124.0.2 netmask 255.255.240.0 broadcast 10.124.15.255
    inet6 fe80::e4ba:27ff:fe0c:e3fb prefixlen 64 scopeid 0x20<link>
    ether e6:ba:27:0c:e3:fb txqueuelen 1000 (Ethernet)
    RX packets 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
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 0 bytes 0 (0.0 B)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 0 bytes 0 (0.0 B)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

```
john@comp232:~/unixland$ ifconfig -a | grep inet
    inet 143.198.238.179 netmask 255.255.240.0 broadcast 143.198.239.255
    inet6 fe80::a8ab:8ff:fedc:eb88 prefixlen 64 scopeid 0x20<link>
    inet 10.124.0.2 netmask 255.255.240.0 broadcast 10.124.15.255
    inet6 fe80::e4ba:27ff:fe0c:e3fb prefixlen 64 scopeid 0x20<link>
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
```

```
john@comp232:~/unixland$ grep eric /etc/passwd|cut -f6 -d:
/home/erick
/home/eric
/home/eric
/home/trenton
/home/Trenton
```

gzip

```
john@comp232:~/unixland$ ls -l passwd
-rw-r--r-- 1 john john 18719 Aug 22 18:00 passwd
```

```
john@comp232:~/unixland$ gzip passwd
```

```
john@comp232:~/unixland$ ls -l passwd.gz
-rw-r--r-- 1 john john 6146 Aug 22 15:57 passwd.gz
```

```
john@comp232:~/unixland$ ls -l passwd.gz /etc/passwd
-rw-r--r-- 1 root root 18719 Jul 24 16:23 /etc/passwd
-rw-r--r-- 1 john john 6146 Aug 22 15:57 passwd.gz
```

```
john@comp232:~/unixland$ gunzip passwd.gz
```

```
john@comp232:~/unixland$ ls -l passwd /etc/passwd
-rw-r--r-- 1 root root 18719 Jul 24 16:23 /etc/passwd
-rw-r--r-- 1 john john 18719 Aug 22 15:57 passwd
```

hostid

```
john@comp232:~/unixland$ hostid          ← Host ids are not guaranteed to be unique and can be changed.
007f0101
```

```
john@comp232:~/unixland$ ifconfig -a | grep ether    ← Tie your software license to the MAC address (ether) instead.
ether aa:ab:08:de:eb:88 txqueuelen 1000 (Ethernet)
ether e6:ba:27:0c:e3:fb txqueuelen 1000 (Ethernet)
```

hostname

```
john@comp232:~/unixland$ hostname
comp232
```

id

```
john@comp232:~/unixland$ id
uid=1026(john) gid=1026(john) groups=1026(john)
```

```
john@comp232:~/unixland$ grep 1026 /etc/passwd          ← grep user id 1026
john:x:1026:1026:JOhn Dempsey:/home/JOHN:/bin/bash
```

```
john@comp232:~/unixland$ grep 1026 /etc/group          ← grep group id 1026
john:*.1026:
```

ln

```
john@comp232:~/unixland$ ls inc
```

```
ls: cannot access 'inc': No such file or directory
```

```
john@comp232:~/unixland$ ln -s /usr/include inc
```

```
john@comp232:~/unixland$ ls -l inc
```

```
lrwxrwxrwx 1 john john 12 Aug 22 16:01 inc -> /usr/include
```

```
john@comp232:~/unixland$ ls -l inc/signal.h
```

```
-rw-r--r-- 1 root root 13040 Jan 28 2025 inc/signal.h
```

```
john@comp232:~/unixland$ ls -l /usr/include/signal.h
```

```
-rw-r--r-- 1 root root 13040 Jan 28 2025 /usr/include/signal.h
```

```
john@comp232:~/unixland$ ls -lR
```

```
.:
```

```
total 56
```

```
-rw-r--r-- 1 john john 17 Aug 22 15:43 both.txt
-rw-rw-r-- 1 john john 10 Aug 22 15:38 hello.txt
-rw-rw-r-- 1 john john 7 Aug 22 15:39 hi.txt
lrwxrwxrwx 1 john john 12 Aug 22 16:01 inc -> /usr/include
drwxr-x--- 2 john john 4096 Aug 22 15:51 mydir
-rw-r--r-- 1 john john 18719 Aug 22 15:57 passwd
-rw-rw-r-- 1 john john 20480 Aug 22 16:01 unixland.txt
```

```
./mydir:
```

```
total 0
```

```
-rw-rw-r-- 1 john john 0 Aug 22 15:48 nexttest.txt
-rw-rw-r-- 1 john john 0 Aug 22 15:47 test.txt
-rw-rw-r-- 1 john john 0 Aug 22 15:51 texas.txt
```

mdsum

```
john@comp232:~/unixland$ md5sum hi.txt hello.txt passwd
```

```
16bf3569a63337b019771452cc626b29 hi.txt
```

```
412f8058539cda58493a5a6c02faf4e4 hello.txt
```

```
b90109f71dccdc6e7b1d19891baecffc passwd
```

mkdir

```
john@comp232:~/unixland$ mkdir -p sun/moon/earth
```

john@comp232:~/unixland\$ **ls -lR sun** ← Recursive

sun:

total 4

drwxrwxr-x 3 john john 4096 Aug 22 16:03 moon

sun/moon:

total 4

drwxrwxr-x 2 john john 4096 Aug 22 16:03 earth

sun/moon/earth:

total 0

john@comp232:~/unixland\$ **mkdir toremove.dir**

john@comp232:~/unixland\$ **touch toremove.dir/test.txt**

john@comp232:~/unixland\$ **ls -lR toremove.dir**

toremove.dir:

total 0

-rw-rw-r-- 1 john john 0 Aug 22 16:05 test.txt

john@comp232:~/unixland\$ **rmdir toremove.dir**

rmdir: failed to remove 'toremove.dir': Directory not empty

john@comp232:~/unixland\$ **ls -ld toremove.dir**

john@comp232:~/unixland\$ **rm toremove.dir/test.txt**

john@comp232:~/unixland\$ **rmdir toremove.dir**

john@comp232:~/unixland\$ **ls -ld toremove.dir**

ls: cannot access 'toremove.dir': No such file or directory

john@comp232:~/unixland\$ **ls -l**

total 76

-rw-rw-r-- 1 john john 10 Aug 22 15:38 hello.txt

-rw-rw-r-- 1 john john 7 Aug 22 15:39 hi.txt

lrwxrwxrwx 1 john john 12 Aug 22 16:01 inc -> /usr/include

drwxr-x--- 2 john john 4096 Aug 22 15:51 mydir

-rw-r--r-- 1 john john 17 Aug 22 15:43 newname.txt

-rw----- 1 john john 73 Aug 22 16:04 nohup.out

-rw-r--r-- 1 john john 18719 Aug 22 15:57 passwd

drwxrwxr-x 3 john john 4096 Aug 22 16:03 sun

-rw-rw-r-- 1 john john 32768 Aug 22 16:05 unixland.txt

nohup

```
john@comp232:~/unixland$ nohup ls &
```

```
[1] 3542173
```

```
john@comp232:~/unixland$ nohup: ignoring input and appending output to 'nohup.out'
```

```
[1]+  Done                nohup ls
```

```
john@comp232:~/unixland$ ls -l
```

```
total 64
```

```
-rw-rw-r-- 1 john john  10 Aug 22 15:38 hello.txt
-rw-rw-r-- 1 john john   7 Aug 22 15:39 hi.txt
lrwxrwxrwx 1 john john  12 Aug 22 16:01 inc -> /usr/include
drwxr-x--- 2 john john 4096 Aug 22 15:51 mydir
-rw-r--r-- 1 john john  17 Aug 22 15:43 newname.txt
-rw----- 1 john john  73 Aug 22 16:04 nohup.out
-rw-r--r-- 1 john john 18719 Aug 22 15:57 passwd
drwxrwxr-x 3 john john 4096 Aug 22 16:03 sun
-rw-rw-r-- 1 john john 20480 Aug 22 16:01 unixland.txt
```

```
john@comp232:~/unixland$ more nohup.out
```

```
hello.txt
```

```
hi.txt
```

```
inc
```

```
mydir
```

```
newname.txt
```

```
nohup.out
```

```
passwd
```

```
sun
```

```
unixland.txt
```

```
john@comp232:~/unixland$ pwd
```

```
/home/JOHN/unixland
```

od

```
john@comp232:~/unixland$ od -ax hi.txt
```

```
00000000 H i n l B y e n l
```

```
        6948 420a 6579 000a
```

```
00000007
```

```
john@comp232:~/unixland$ od -ax hello.txt
```

```
00000000 H e l l o n l B y e n l
```

```
        6548 6c6c 0a6f 7942 0a65
```

```
0000012
```

ps

```
john@comp232:~/unixland$ ps
  PID TTY          TIME CMD
 3541570 pts/5    00:00:00 bash
 3542186 pts/5    00:00:00 ps
```

sftp

```
john@comp232:~/unixland$ sftp comp232.com
The authenticity of host 'comp232.com (127.0.1.1)' can't be established.
ED25519 key fingerprint is SHA256:P8FjJNEXYd/EXJzqrkRqNpbij/f/U8lu0ILZn9A9hR4.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'comp232.com' (ED25519) to the list of known hosts.
john@comp232.com's password:
Connected to comp232.com.
```

sftp> help

Available commands:

bye	Quit sftp
cd path	Change remote directory to 'path'
chgrp [-h] grp path	Change group of file 'path' to 'grp'
chmod [-h] mode path	Change permissions of file 'path' to 'mode'
chown [-h] own path	Change owner of file 'path' to 'own'
copy oldpath newpath	Copy remote file
cp oldpath newpath	Copy remote file
df [-hi] [path]	Display statistics for current directory or filesystem containing 'path'
exit	Quit sftp
get [-afpR] remote [local]	Download file
help	Display this help text
lcd path	Change local directory to 'path'
lls [ls-options] [path]	Display local directory listing
lmkdir path	Create local directory
ln [-s] oldpath newpath	Link remote file (-s for symlink)
lpwd	Print local working directory
ls [-lafhlNrSt] [path]	Display remote directory listing
lumask umask	Set local umask to 'umask'
mkdir path	Create remote directory
progress	Toggle display of progress meter
put [-afpR] local [remote]	Upload file
pwd	Display remote working directory
quit	Quit sftp
reget [-fpR] remote [local]	Resume download file
rename oldpath newpath	Rename remote file
reput [-fpR] local [remote]	Resume upload file
rm path	Delete remote file
rmdir path	Remove remote directory

symlink oldpath newpath	Symlink remote file
version	Show SFTP version
!command	Execute 'command' in local shell
!	Escape to local shell
?	Synonym for help

sftp> ls

EXTRA	EXTRA.2
EXTRA_HOME	Fall 2024 How to Install Ubuntu 24.04.pdf
LAB1	LAB10
LAB11	LAB5
LAB5_2	LAB7
LAB8	LAB9
LAB9_2	LABS
LABTEST	a.out
c	tictactoe.c
tictactoe.d	unixland
unixland.txt	voters_camarillo.sql

sftp> mkdir LAB4

sftp> ls LAB4

sftp> cd LAB4

sftp> ls

sftp> ll

hello.txt hi.txt inc mydir newname.txt nohup.out passwd sun unixland.txt

sftp> put hello.txt

Uploading hello.txt to /home/JOHN/LAB4/hello.txt

hello.txt 100% 10 25.6KB/s 00:00

sftp> mput *

Uploading hello.txt to /home/JOHN/LAB4/hello.txt

hello.txt 100% 10 31.0KB/s 00:00

Uploading hi.txt to /home/JOHN/LAB4/hi.txt

hi.txt 100% 7 30.3KB/s 00:00

Uploading inc/ to /home/JOHN/LAB4/inc

local "inc/" is not a regular file

Uploading mydir/ to /home/JOHN/LAB4/mydir

local "mydir/" is not a regular file

Uploading newname.txt to /home/JOHN/LAB4/newname.txt

newname.txt 100% 17 71.7KB/s 00:00

Uploading nohup.out to /home/JOHN/LAB4/nohup.out

nohup.out 100% 73 299.0KB/s 00:00

Uploading passwd to /home/JOHN/LAB4/passwd

```
passwd                                100% 18KB 38.4MB/s 00:00
Uploading sun/ to /home/JOHN/LAB4/sun
local "sun/" is not a regular file
Uploading unixland.txt to /home/JOHN/LAB4/unixland.txt
unixland.txt                          100% 40KB 35.5MB/s 00:00
```

```
sftp> ls
hello.txt  hi.txt    newname.txt  nohup.out  passwd    unixland.txt
```

```
sftp> pwd
Remote working directory: /home/JOHN/LAB4
```

```
sftp> lpwd

Local working directory: /home/JOHN/unixland
sftp> quit
```

sleep

```
john@comp232:~/unixland$ sleep 5
```

sort

```
john@comp232:~/unixland$ cut -f7 -d: /etc/passwd | sort -u
/bin/bash
/bin/false
/bin/sync
/usr/sbin/nologin
```

ssh

```
john@comp232:~/unixland$ ssh john@comp232.com ← User name not needed if user name same on both systems.
```

```
john@comp232.com's password:
```

```
Welcome to Ubuntu 24.04.1 LTS (GNU/Linux 6.8.0-45-generic x86_64)
```

- * Documentation: <https://help.ubuntu.com>
- * Management: <https://landscape.canonical.com>
- * Support: <https://ubuntu.com/pro>

```
System information as of Tue Jun 17 09:39:09 PDT 2025
```

```
System load: 0.08      Processes:      138
Usage of /: 50.2% of 48.27GB  Users logged in: 0
Memory usage: 38%      IPv4 address for eth0: 143.198.238.179
Swap usage: 0%         IPv4 address for eth0: 10.48.0.5
```

Expanded Security Maintenance for Applications is not enabled.

178 updates can be applied immediately.

9 of these updates are standard security updates.

To see these additional updates run: `apt list --upgradable`

4 additional security updates can be applied with ESM Apps.

Learn more about enabling ESM Apps service at <https://ubuntu.com/esm>

*** System restart required ***

Last login: Wed Sep 18 13:23:43 2024 from 209.129.115.53

```
john@comp232:~$ pwd
/home/JOHN
```

```
john@comp232:~$ uname -a
Linux comp232 6.8.0-45-generic #45-Ubuntu SMP PREEMPT_DYNAMIC Fri Aug 30 12:02:04 UTC 2024 x86_64 x86_64
x86_64 GNU/Linux
```

```
john@comp232:~$ exit
logout
Connection to comp232.com closed.
```

```
john@comp232:~/unixland$ ssh john@143.198.238.179
The authenticity of host '143.198.238.179 (143.198.238.179)' can't be established.
ED25519 key fingerprint is SHA256:P8FjJNEXYd/EXJzqrkRqNpbij/f/U8lu0ILZn9A9hR4.
This host key is known by the following other names/addresses:
  ~/.ssh/known_hosts:1: [hashed name]
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '143.198.238.179' (ED25519) to the list of known hosts.
john@143.198.238.179's password:
Welcome to Ubuntu 24.04.1 LTS (GNU/Linux 6.8.0-45-generic x86_64)
```

- * Documentation: <https://help.ubuntu.com>
- * Management: <https://landscape.canonical.com>
- * Support: <https://ubuntu.com/pro>

System information as of Tue Jun 17 09:39:09 PDT 2025

```
System load: 0.08      Processes:      138
Usage of /:  50.2% of 48.27GB  Users logged in:  0
Memory usage: 38%      IPv4 address for eth0: 143.198.238.179
Swap usage:  0%        IPv4 address for eth0: 10.48.0.5
```

Expanded Security Maintenance for Applications is not enabled.

178 updates can be applied immediately.
9 of these updates are standard security updates.
To see these additional updates run: `apt list --upgradable`

4 additional security updates can be applied with ESM Apps.
Learn more about enabling ESM Apps service at <https://ubuntu.com/esm>

*** System restart required ***

Last login: Fri Aug 22 16:10:20 2025 from 127.0.0.1

john@comp232:~\$ **uname -a**

Linux comp232 6.8.0-45-generic #45-Ubuntu SMP PREEMPT_DYNAMIC Fri Aug 30 12:02:04 UTC 2024 x86_64 x86_64
x86_64 GNU/Linux

john@comp232:~\$ **exit**

logout

Connection to 143.198.238.179 closed.

stty

john@comp232:~/unixland\$ **stty**

speed 38400 baud; line = 0;

-brkint ixany iutf8

sync

john@comp232:~/unixland\$ **sync**

john@comp232:~/unixland\$ **sync**

← What's the difference between typing sync once vs. twice?

tar

john@comp232:~/unixland\$ **ls**

hello.txt hi.txt inc mydir newname.txt nohup.out passwd sun unixland.txt

john@comp232:~/unixland\$ **tar cvf /tmp/unixland.tar .**

./

./hello.txt

./passwd

./mydir/

./mydir/test.txt

./mydir/texas.txt

./mydir/nexttest.txt

./newname.txt

./sun/

```
./sun/moon/  
./sun/moon/earth/  
./unixland.txt  
./nohup.out  
./hi.txt  
./inc
```

```
john@comp232:~/unixland$ ls -l /tmp/unixland.tar  
-rw-rw-r-- 1 john john 81920 Aug 22 16:12 /tmp/unixland.tar
```

```
john@comp232:~/unixland$ tar tvf /tmp/unixland.tar      ← Table of contents for files in unixland.tar
```

drwxrwxr-x	john/john	0	2025-08-22	16:06	./
-rw-rw-r--	john/john	10	2025-08-22	15:38	./hello.txt
-rw-r--r--	john/john	18719	2025-08-22	15:57	./passwd
drwxr-x---	john/john	0	2025-08-22	15:51	./mydir/
-rw-rw-r--	john/john	0	2025-08-22	15:47	./mydir/test.txt
-rw-rw-r--	john/john	0	2025-08-22	15:51	./mydir/texas.txt
-rw-rw-r--	john/john	0	2025-08-22	15:48	./mydir/nexttest.txt
-rw-r--r--	john/john	17	2025-08-22	15:43	./newname.txt
drwxrwxr-x	john/john	0	2025-08-22	16:03	./sun/
drwxrwxr-x	john/john	0	2025-08-22	16:03	./sun/moon/
drwxrwxr-x	john/john	0	2025-08-22	16:03	./sun/moon/earth/
-rw-rw-r--	john/john	49152	2025-08-22	16:10	./unixland.txt
-rw-----	john/john	73	2025-08-22	16:04	./nohup.out
-rw-rw-r--	john/john	7	2025-08-22	15:39	./hi.txt
lrwxrwxrwx	john/john	0	2025-08-22	16:01	./inc -> /usr/include

```
john@comp232:~/unixland$ ls  
hello.txt hi.txt inc mydir newname.txt nohup.out passwd sun unixland.txt
```

```
john@comp232:~/unixland$ cd mydir
```

```
john@comp232:~/unixland/mydir$ ls  
nexttest.txt test.txt texas.txt
```

```
john@comp232:~/unixland/mydir$ mkdir TAR
```

```
john@comp232:~/unixland/mydir$ cd TAR
```

```
john@comp232:~/unixland/mydir/TAR$ tar xvf /tmp/unixland.tar      ← 'x' extracts files in unixland.tar.
```

```
./  
./hello.txt  
./passwd  
./mydir/  
./mydir/test.txt  
./mydir/texas.txt  
./mydir/nexttest.txt  
./newname.txt
```

```
./sun/  
./sun/moon/  
./sun/moon/earth/  
./unixland.txt  
./nohup.out  
./hi.txt  
./inc
```

john@comp232:~/unixland/mydir/TAR\$ **ls -l**

```
total 92  
-rw-rw-r-- 1 john john    10 Aug 22 15:38 hello.txt  
-rw-rw-r-- 1 john john     7 Aug 22 15:39 hi.txt  
lrwxrwxrwx 1 john john    12 Aug 22 16:01 inc -> /usr/include  
drwxr-x--- 2 john john  4096 Aug 22 15:51 mydir  
-rw-r--r-- 1 john john    17 Aug 22 15:43 newname.txt  
-rw----- 1 john john    73 Aug 22 16:04 nohup.out  
-rw-r--r-- 1 john john 18719 Aug 22 15:57 passwd  
drwxrwxr-x 3 john john  4096 Aug 22 16:03 sun  
-rw-rw-r-- 1 john john 49152 Aug 22 16:10 unixland.txt
```

john@comp232:~/unixland/mydir/TAR\$ **pwd**
/home/JOHN/unixland/mydir/TAR

uptime

john@comp232:~/unixland/mydir/TAR\$ **uptime**
16:14:24 up 317 days, 17:49, 5 users, load average: 1.01, 1.07, 1.02

w

john@comp232:~/unixland\$ **w**
18:26:26 up 317 days, 20:01, 6 users, load average: 1.00, 1.01, 1.00
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root pts/4 104.34.170.21 15:37 2:44m 0.00s 1.30s sshd: root@pts/4
root pts/6 104.34.170.21 15:40 2:44m 0.00s 0.06s sshd: root@pts/6
john pts/1 127.0.0.1 17:15 2:44m 0.00s 0.02s sshd: john [priv]

who

john@comp232:~/unixland/mydir/TAR\$ **who**
root pts/4 2025-08-22 15:37 (104.34.170.21)
root pts/6 2025-08-22 15:40 (104.34.170.21)

which

```
john@comp232:~/unixland/mydir/TAR$ which gzip
/usr/bin/gzip
```

```
john@comp232:~/unixland/mydir/TAR$ which ls
/usr/bin/ls
```

whoami

```
john@comp232:~/unixland/mydir/TAR$ whoami
john
```

← Now that you know who you are, we're done! 😊

exit

```
john@comp232:~/unixland/mydir/TAR$ exit
exit
Script done.
```

← Exits running the **script unixland.txt** command.

Make sure you typed exit to save your work!

```
john@comp232:~/unixland$ ls -l unixland.txt
-rw-rw-r-- 1 john john 55258 Aug 22 16:14 unixland.txt
```

```
john@comp232:~/unixland$ pwd
/home/JOHN/unixland
```

After exiting the script command, you should now have a unixland.txt file ready to upload to comp232.com.

To turn in your work to receive full credit for this assignment, please:

```
% sftp <username>@comp232.com
```

```
sftp> cd LAB4
```

```
sftp> put unixland.txt
```

```
sftp> ls -l
```

```
sftp> quit
```

```
% exit
```