

ERASMUS, UNIVERSITY OF WEST ATTICA

# **Report**

**Discipline: Operating Systems**

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**Greece, Athens – 2025**

## Task

1. Create in your working directory a file named 'ask1.txt' with the following contents (first name, last name, username, postal code, city, tel). Display the contents of the file, with its lines numbered.

```
George Pappas george2 12136 Peristeri -----
Nick Nikolaoy nick23 12232 Aigaleo 5314555
George Georgioy george583 11132 Athens -----
Helen Georgioy helen3 12136 Peristeri 5748456
Nick Pappas nick4 11223 Aigaleo 5324123
Helen Ioannoy helen367 13222 Athens -----
Helen Thanoy helen36 11132 Peristeri 9718345
Vasilis Mamalis vas32 12345 Dafni 9738383
```

```
[bash-5.2$ cat -n ask1.txt
  1  George Pappas george2 12136 Peristeri -----
  2  Nick Nikolaoy nick23 12232 Aigaleo 5314555
  3  George Georgioy george583 11132 Athens -----
  4  Helen Georgioy helen3 12136 Peristeri 5748456
  5  Nick Pappas nick4 11223 Aigaleo 5324123
  6  Helen Ioannoy helen367 13222 Athens -----
  7  Helen Thanoy helen36 11132 Peristeri 9718345
  8  Vasilis Mamalis vas32 12345 Dafni 9738383bash-5.2$
```

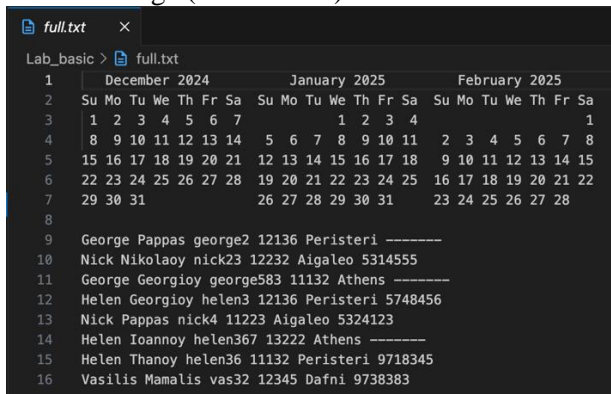
2. Run the command 'cal -3 > calfile.txt' and explain what exactly does.

The cal -3 command displays a **three-month calendar**:

- The **current month**,
- The **previous month**, and
- The **next month**.

The > operator **redirects** the output into calfile.txt, creating or overwriting the file.

3. Merge (concatenate) the files 'calfile.txt' and 'ask1.txt' into one file named 'full.txt'.



```
Lab_basic > full.txt
  1  December 2024      January 2025      February 2025
  2  Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa Su Mo Tu We Th Fr Sa
  3  1 2 3 4 5 6 7      1 2 3 4      1
  4  8 9 10 11 12 13 14 5 6 7 8 9 10 11 2 3 4 5 6 7 8
  5  15 16 17 18 19 20 21 12 13 14 15 16 17 18 9 10 11 12 13 14 15
  6  22 23 24 25 26 27 28 19 20 21 22 23 24 25 16 17 18 19 20 21 22
  7  29 30 31      26 27 28 29 30 31 23 24 25 26 27 28
  8
  9  George Pappas george2 12136 Peristeri -----
 10  Nick Nikolaoy nick23 12232 Aigaleo 5314555
 11  George Georgioy george583 11132 Athens -----
 12  Helen Georgioy helen3 12136 Peristeri 5748456
 13  Nick Pappas nick4 11223 Aigaleo 5324123
 14  Helen Ioannoy helen367 13222 Athens -----
 15  Helen Thanoy helen36 11132 Peristeri 9718345
 16  Vasilis Mamalis vas32 12345 Dafni 9738383
```

4. List the five most recently modified files of your working directory.

```
bash-5.2$ ls -lt | head -5
total 800
-rw-r--r--  1 danielistrati  staff    888 Jan 30 17:29 full.txt
-rw-r--r--@ 1 danielistrati  staff 180112 Jan 30 17:29 Istrati_Daniel_Report_Lab_Basic.docx
-rw-r--r--@ 1 danielistrati  staff   162 Jan 30 17:17 ~$trati_Daniel_Report_Lab_Basic.docx
-rw-r--r--  1 danielistrati  staff   536 Jan 30 17:15 calfile.txt
```

5. Create a directory named 'mydir1'. Move to the new directory and copy there the file 'full.txt' (from the parent dir). Then, rename it to 'new.txt'. Return to the parent directory. Remove directory 'mydir1' and its contents.

```

bash-5.2$ mkdir mydir1 # Create directory
mv full.txt mydir1/ # Move full.txt into mydir1
cd mydir1 # Enter the new directory
mv full.txt new.txt # Rename full.txt to new.txt
cd .. # Return to parent directory
rm -r mydir1 # Remove mydir1 and its contents
bash-5.2$ ls
Erasmus_OS1_Lab_basic.pdf ask1.txt ~$trati_Daniel_Report_Lab_Basic.docx
Istrati_Daniel_Report_Lab_Basic.docx calfile.txt
bash-5.2$

```

6. Give the proper commands to display: (α) all the files of director /usr, with information for their inode and their size in blocks. (β) all the contents of the directory tree (recursively - i.e. including subdirectories etc.) under directory /usr, with full details for each of them (and display them page by page).

```
ls -li -s /usr
```

```

bash-5.2$ ls -li -s /usr
total 0
1152921500312497881 0 X11 1152921500312499522 0 lib 1152921500312501967 0/sbin
1152921500312497882 0 X11R6 1152921500312500634 0 libexec 1152921500312502408 0 share
1152921500312497883 0 bin 22538068 0 local 1152921500312532714 0 standalone

```

```
ls -lR /usr | less
```

```

total 0
lrwxr-xr-x 1 root wheel 25 Dec 7 10:11 X11 -> ../private/var/select/X11
lrwxr-xr-x 1 root wheel 25 Dec 7 10:11 X11R6 -> ../private/var/select/X11
drwxr-xr-x 917 root wheel 29344 Dec 7 10:11 bin
drwxr-xr-x 32 root wheel 1024 Dec 7 10:11 lib
drwxr-xr-x 380 root wheel 12160 Dec 7 10:11 libexec
drwxr-xr-x 3 root wheel 96 Jan 1 21:24 local
drwxr-xr-x 229 root wheel 7328 Dec 7 10:11/sbin
drwxr-xr-x 43 root wheel 1376 Dec 7 10:11 share
drwxr-xr-x 5 root wheel 160 Dec 7 10:11 standalone

/usr/bin:
total 242896
-rwxr-xr-x 1 root wheel 171888 Dec 7 10:11 AssetCacheLocatorUtil
-rwxr-xr-x 1 root wheel 227712 Dec 7 10:11 AssetCacheManagerUtil
-rwxr-xr-x 1 root wheel 172976 Dec 7 10:11 AssetCacheTetheratorUtil
-rwxr-xr-x 78 root wheel 118848 Dec 7 10:11 DeRez
-rwxr-xr-x 78 root wheel 118848 Dec 7 10:11 GetFileInfo
-rwxr-xr-x 1 root wheel 240208 Dec 7 10:11 IOAccelMemory
-rwxr-xr-x 1 root wheel 244640 Dec 7 10:11 IOMFB_FDR_Loader
-rwxr-xr-x 1 root wheel 170336 Dec 7 10:11 IOSDebug
-rwxr-xr-x 78 root wheel 118848 Dec 7 10:11 ResMerger
-rwxr-xr-x 78 root wheel 118848 Dec 7 10:11 Rez
-rwxr-xr-x 1 root wheel 136048 Dec 7 10:11 SafeEjectGPU
-rwxr-xr-x 78 root wheel 118848 Dec 7 10:11 SetFile
-rwxr-xr-x 78 root wheel 118848 Dec 7 10:11 SplitForks
-rwxr-xr-x 1 root wheel 329792 Dec 7 10:11 aa
-rwxr-xr-x 16 root wheel 118912 Dec 7 10:11 actool
-rwxr-xr-x 1 root wheel 221584 Dec 7 10:11 aea
-rwxr-xr-x 1 root wheel 171232 Dec 7 10:11 afclip
-rwxr-xr-x 1 root wheel 361648 Dec 7 10:11 afconvert
-rwxr-xr-x 1 root wheel 136000 Dec 7 10:11 afhash
-rwxr-xr-x 1 root wheel 220096 Dec 7 10:11 afida
-rwxr-xr-x 1 root wheel 226288 Dec 7 10:11 afinfo
-rwxr-xr-x 1 root wheel 227936 Dec 7 10:11 afktool
-rwxr-xr-x 1 root wheel 173664 Dec 7 10:11 afplay
-rwxr-xr-x 1 root wheel 564800 Dec 7 10:11 afscxexpand
-rwxr-xr-x 1 root wheel 120944 Dec 7 10:11 agentxttrap
-rwxr-xr-x 16 root wheel 118912 Dec 7 10:11 agvtool
-rwxr-xr-x 15 root wheel 120 Dec 7 10:11 alias
-rwxr-xr-x 1 root wheel 173584 Dec 7 10:11 app-sso
-rwxr-xr-x 1 root wheel 169216 Dec 7 10:11 applesingle
-rwxr-xr-x 1 root wheel 102400 Dec 7 10:11 apply
-r-xr-xr-x 4 root wheel 32136 Dec 7 10:11 apropos
-rwxr-xr-x 78 root wheel 118848 Dec 7 10:11 ar

```

7. Create a directory named 'testdir1'. Move to the new directory and create there a 'hard link' (named 'ask1link') to the file 'ask1.txt' of the parent directory. Confirm (giving the proper command and explaining what you see) that the link has been created and that it's a 'hard' link and not a 'symbolic' (soft) link.

```

bash-5.2$ mkdir testdir1 # Create testdir1
ln ask1.txt testdir1/ask1link # Create a hard link to ask1.txt
ls -l ask1.txt testdir1/ask1link # Verify link
-rw-r--r-- 2 danielistrati staff 352 Jan 30 16:41 ask1.txt
-rw-r--r-- 2 danielistrati staff 352 Jan 30 16:41 testdir1/ask1link

```

- `ln` creates a **hard link**.
- `ls -l` shows the **same inode number** for `ask1.txt` and `ask1link`, proving it's a hard link

8. Get inside file 'ask1link' and remove its last line. Has that change been done in file 'ask1.txt' too?. Display the contents of 'ask1.txt' and explain.

```
bash-5.2$ sed -i '' '$d' testdir1/ask1link
[cat ask1.txt
George Pappas george2 12136 Peristeri -----
Nick Nikolaoy nick23 12232 Aigaleo 5314555
George Georgioy george583 11132 Athens -----
Helen Georgioy helen3 12136 Peristeri 5748456
Nick Pappas nick4 11223 Aigaleo 5324123
Helen Ioannoy helen367 13222 Athens -----
Helen Thanoy helen36 11132 Peristeri 9718345
```

- Since it's a **hard link**, both files share the same inode.
- **Changes in ask1link affect ask1.txt** because they are the **same physical file**.

9. Create a directory 'kat1' and two files (inside kat1) named 'file1' and 'file2', with contents the words 'one' and 'two', respectively. Run (inside kat1) the command 'cp \*' and explain the result. Then run the command 'mv \*' and explain the result.

```
bash-5.2$ mkdir kat1
cd kat1
echo "one" > file1
[echo "two" > file2
cp: destination. is not a directory
mv: destination is not a directory
```

- **cp \*** → Fails because it requires a destination.
- **mv \*** → Fails because it requires a destination.

10. Display the lines of file 'ask1.txt' than end with one or more consecutive digits.

```
bash-5.2$ grep '[0-9]\+$' ask1.txt
Nick Nikolaoy nick23 12232 Aigaleo 5314555
Helen Georgioy helen3 12136 Peristeri 5748456
Nick Pappas nick4 11223 Aigaleo 5324123
Helen Thanoy helen36 11132 Peristeri 9718345
Vasilis Mamalis vas32 12345 Dafni 9738383
```

11. Display the lines of file 'ask1.txt' that contain the pattern 'Pap' but they don't contain the pattern 'Aig'.

```
bash-5.2$ grep 'Pap' ask1.txt | grep -v 'Aig'
George Pappas george2 12136 Peristeri -----
```

- **grep 'Pap'** → Filters lines containing **Pap**.
- **grep -v 'Aig'** → Excludes lines containing **Aig**.

12. Display the lines of file 'ask1.txt' that begin with 'G' or 'N' and contain the patterns 'Geo' και 'Per' (in that order).

```
bash-5.2$ grep '^[GN].*Per' ask1.txt
George Pappas george2 12136 Peristeri -----
```

13. How many users are connected to the system and their username does not begin with 'os1' ?

```
bash-5.2$ who | awk '!/^os1/ {print $1}' | sort -u | wc -l
1
```

- **who** → Lists logged-in users.
- **awk '!/^os1/'** → Excludes usernames **starting with os1**.
- **sort -u | wc -l** → Counts **unique** users.

14. Display all the user processes (attached to a terminal) running in the system.

```
bash-5.2$ ps -u $USER
  UID   PID TTY          TIME CMD
 501   404 ??        0:14.49 /usr/sbin/distnoted agent
 501   406 ??        0:13.53 /usr/sbin/cfprefd agent
 501   410 ??        0:07.04 /usr/libexec/UserEventAgent (Aqua)
 501   414 ??        0:04.78 /System/Library/CoreServices/CoreServicesUIAgent.app/Contents/MacOS/CoreServicesUIAgent
 501   415 ??        0:01.83 /usr/sbin/UniversalAccessd launchd -s
 501   416 ??        0:44.93 /System/Library/CoreServices/WindowManager.app/Contents/MacOS/WindowManager
 501   417 ??        0:00.44 /System/Library/CoreServices/talagentd
 501   418 ??        0:19.38 /System/Library/CoreServices/Dock.app/Contents/MacOS/Dock
 501   419 ??        0:00.68 /usr/libexec/pboard
 501   420 ??        0:23.09 /System/Library/CoreServices/ControlCenter.app/Contents/MacOS/ControlCenter
 501   421 ??        0:01.67 /System/Library/CoreServices/SystemUIServer.app/Contents/MacOS/SystemUIServer
 501   422 ??        0:00.43 /System/Library/PrivateFrameworks/BackgroundTaskManagement.framework/Support/BackgroundTaskManagementAgent.app/Co
 501   423 ??        0:49.47 /System/Library/CoreServices/finder.app/Contents/MacOS/finder
 501   424 ??        0:06.18 /usr/libexec/lsd
 501   427 ??        0:11.07 /usr/libexec/seed
 501   428 ??        0:00.02 /System/Library/Frameworks/CoreServices.framework/Versions/A/Frameworks/CarbonCore.framework/Versions/A/XPCService
 501   429 ??        0:00.60 /System/Library/Frameworks/CoreTelephony.framework/Support/CommCenter -L
 501   430 ??        0:00.54 /System/Library/Frameworks/QuickLookUI.framework/Versions/A/XPCServices/QuickLookUIService.xpc/Contents/MacOS/Quic
 501   431 ??        0:00.30 /usr/libexec/dmd
 501   432 ??        0:00.04 /System/Library/CoreServices/APFSUserAgent
 501   433 ??        0:06.67 /usr/libexec/nsurlsessiond
 501   435 ??        0:01.30 /usr/libexec/secinitd
 501   436 ??        0:03.20 /usr/libexec/sasportd
 501   437 ??        0:00.31 /System/Library/CoreServices/ControlStrip.app/Contents/MacOS/ControlStrip
 501   438 ??        0:00.96 /usr/sbin/usernoted
 501   439 ??        0:06.57 /usr/libexec/routined LAUNCHED BY LAUNCHD
 501   440 ??        0:10.51 /System/Library/PrivateFrameworks/CoreDuetContext.framework/Resources/ContextStoreAgent
 501   441 ??        0:03.43 /System/Library/Frameworks/QuickLookThumbnailing.framework/Support/com.apple.quicklook.ThumbnailsAgent
 501   442 ??        0:25.14 /usr/libexec/trustd --agent
 501   443 ??        0:04.28 /System/Library/CoreServices/lockoutagent
 501   444 ??        0:04.52 /System/Library/CoreServices/WallpaperAgent.app/Contents/MacOS/WallpaperAgent
 501   446 ??        0:00.86 /System/Library/CoreServices/sharedfilelistd
 501   448 ??        0:09.62 /System/Library/PrivateFrameworks/FileProvider.framework/Support/fileproviderd
 501   449 ??        0:01.46 /usr/libexec/oid
 501   450 ??        0:01.34 /System/Library/PrivateFrameworks/VoiceShortcuts.framework/Versions/A/Support/siriactionsd
 501   451 ??        0:00.11 /System/Library/PrivateFrameworks/AMPDevices.framework/Versions/A/Support/AMPDeviceDiscoveryAgent --launchd
```

and more.

15. How many user processes run in the system and their name ends with 'sh' ?

```
bash-5.2$ ps -u $USER | grep 'sh$' | wc -l
5
```

16. Display the processes (of any type) running from the account of the system administrator.

```
bash-5.2$ ps -U root -u root
  UID   PID TTY          TIME CMD
 0       1 ??        1:49.39 /sbin/launchd
 0      92 ??        0:38.38 /usr/libexec/logd
 0      93 ??        0:00.08 /usr/libexec/smd
 0      94 ??        0:03.34 /usr/libexec/UserEventAgent (System)
 0      96 ??        0:54.84 /System/Library/Frameworks/CoreServices.framework/Versions/A/Frameworks/FSEvents.framework/Versio
 0      97 ??        0:04.77 /System/Library/PrivateFrameworks/MediaRemote.framework/Support/mediaremoted
 0     100 ??        0:03.28 /usr/sbin/systemstats --daemon
 0     103 ??        0:07.45 /usr/libexec/configd
 0     104 ??        0:00.02 endpointsecurityd
 0     105 ??        0:13.85 /System/Library/CoreServices/powerd.bundle/powerd
 0     106 ??        0:00.03 /usr/libexec/IOMFB_bics_daemon
 0     108 ??        0:00.80 /usr/libexec/amfid
 0     110 ??        0:00.05 /usr/libexec/ramoted
 0     112 ??        0:00.03 /usr/libexec/keybagd -t 15
 0     115 ??        0:01.01 /usr/libexec/watchdogd
 0     119 ??        1:10.18 /System/Library/Frameworks/CoreServices.framework/Frameworks/Metadata.framework/Support/mds
 0     121 ??        0:00.78 /usr/libexec/kernelmanagerd
 0     122 ??        0:01.57 /usr/libexec/diskarbitrationd
 0     125 ??        1:02.74 /usr/libexec/coreduetd
 0     126 ??        0:00.72 /usr/sbin/syslogd
 0     129 ??        0:16.23 /usr/libexec/thermalmonitord
 0     130 ??        0:45.12 /usr/libexec/opendirectoryd
 0     132 ??        0:06.14 /System/Library/PrivateFrameworks/ApplePushService.framework/apspd
 0     133 ??        1:05.57 /System/Library/CoreServices/launchservicesd
 0     136 ??        0:02.07 /usr/sbin/securityd -i
 0     139 ??        0:00.34 /usr/libexec/nesessionmanager
 0     141 ??        0:00.02 autofsd
 0     142 ??        0:23.22 /usr/libexec/dasd
 0     145 ??        0:00.00 /System/Library/PrivateFrameworks/AppleCredentialManager.framework/AppleCredentialManagerDaemon
 0     147 ??        0:00.08 /usr/libexec/dirhelper
 0     148 ??        0:00.12 /System/Library/CoreServices/loginD
 0     149 ??        0:00.17 /System/Library/PrivateFrameworks/GenerationalStorage.framework/Versions/A/Support/revisioid
 0     150 ??        0:00.01 /usr/sbin/KernelEventAgent
 0     151 ??        0:00.17 /usr/libexec/usermanagerd -t 15
 0     153 ??        0:13.85 /usr/sbin/bluetoothd
 0     154 ??        0:12.04 /usr/sbin/notifyd
 0     155 ??        0:00.89 /usr/libexec/sandboxd
 0     156 ??        0:42.77 /usr/libexec/corebrightnessd --launchd
```

and more.

17. How many files of your current directory (only the current - not including subdirectories) have permissions 'rw' for all (user, group, others) και 'x' for none ?

```
bash-5.2$ find . -maxdepth 1 -type f -perm 666 | wc -l
0
bash-5.2$ ls
Erasmus_OS1_Lab_basic.pdf      calfile.txt                  ~Strati_Daniel_Report_Lab_Basic.docx
Istrati_Daniel_Report_Lab_Basic.docx  kat1                         ask1.txt
ask1.txt                        testdir1
```

- -maxdepth 1 → Only check **current directory**.
- -perm 666 → Match rw-rw-rw-.



18. Find (and list with full details) all the directories of the system, with name beginning with 'b'.

```
bash-5.2$ find / -type d -name "b*" -ls 2>/dev/null
1152921500312497883 0 drwxr-xr-x 917 root wheel wheel 29344 Dec 7 10:11 /usr/bin
22537986 0 drwxr-xr-x 16 root wheel wheel 512 Dec 7 10:11 /usr/libexec/cups/backend
810188 0 drwxr-xr-x 23 root wheel wheel 736 Dec 3 00:21 /usr/local/bin
1152921500312499735 0 drwxr-xr-x 9 root wheel wheel 288 Dec 7 10:11 /usr/lib/usb/libraries/bxsf
1152921500312504090 0 drwxr-xr-x 148 root wheel wheel 4736 Dec 7 10:11 /usr/share/firmware/bluetooth
1152921500312510047 0 drwxr-xr-x 8 root wheel wheel 256 Dec 7 10:11 /usr/share/locale/bg_BG
1152921500312510028 0 drwxr-xr-x 8 root wheel wheel 256 Dec 7 10:11 /usr/share/locale/be_BY.UTF-8
1152921500312509996 0 drwxr-xr-x 8 root wheel wheel 256 Dec 7 10:11 /usr/share/locale/be_BY
1152921500312510008 0 drwxr-xr-x 8 root wheel wheel 256 Dec 7 10:11 /usr/share/locale/be_BY.CP1251
1152921500312510018 0 drwxr-xr-x 8 root wheel wheel 256 Dec 7 10:11 /usr/share/locale/be_BY.ISO8859-5
1152921500312510048 0 drwxr-xr-x 8 root wheel wheel 256 Dec 7 10:11 /usr/share/locale/bg_BG.CP1251
1152921500312509997 0 drwxr-xr-x 8 root wheel wheel 256 Dec 7 10:11 /usr/share/locale/be_BY.CP1131
1152921500312510060 0 drwxr-xr-x 8 root wheel wheel 256 Dec 7 10:11 /usr/share/locale/bg_BG.UTF-8
1152921500312508102 0 drwxr-xr-x 9 root wheel wheel 288 Dec 7 10:11 /usr/share/httpd/build
1152921500312502782 0 drwxr-xr-x 11 root wheel wheel 352 Dec 7 10:11 /usr/share/doc/bash
1152921500312502448 0 drwxr-xr-x 8 root wheel wheel 256 Dec 7 10:11 /usr/share/cups/banners
1152921500312497678 0 drwxr-xr-x 39 root wheel wheel 1248 Dec 7 10:11 /bin
10978233 0 drwxr-xr-x 3 root wheel wheel 96 Oct 29 2022 /Library/Apple/usr/bin
22539280 0 drwxr-xr-x 3 root wheel wheel 96 Dec 7 10:11 /Library/Apple/System/Library/PrivateFrameworks/RemotePairi
ng.framework/Versions/A/Resources/bin
16827802 0 drwxr-xr-x 3 root admin admin 96 Apr 2 2019 /Library/Application Support/LogMeIn Hamachi/bin
9407767 0 drwxr-xr-x 3 root admin admin 96 Dec 11 20:19 /Library/Application Support/obs-studio/plugins/logi_obs_plu
gin/bin
58260 0 drwxrwxr-x 3 root wheel wheel 96 Dec 3 10:12 /Library/Developer/CoreSimulator/Volumes/iOS_22C150/Library/D
eveloper/CoreSimulator/Profiles/Runtimes/iOS 18.2.simruntime/Contents/Resources/RuntimeRoot/Developer/usr/bin
559762 0 drwxr-xr-x 33 root wheel wheel 1056 Dec 3 10:12 /Library/Developer/CoreSimulator/Volumes/iOS_22C150/Library/D
eveloper/CoreSimulator/Profiles/Runtimes/iOS 18.2.simruntime/Contents/Resources/RuntimeRoot/usr/bin
560117 0 drwxr-xr-x 9 root wheel wheel 288 Dec 3 10:12 /Library/Developer/CoreSimulator/Volumes/iOS_22C150/Library/D
eveloper/CoreSimulator/Profiles/Runtimes/iOS 18.2.simruntime/Contents/Resources/RuntimeRoot/usr/lib/usb/libraries/bxsf
559724 0 drwxr-xr-x 4 root wheel wheel 128 Dec 3 10:12 /Library/Developer/CoreSimulator/Volumes/iOS_22C150/Library/D
eveloper/CoreSimulator/Profiles/Runtimes/iOS 18.2.simruntime/Contents/Resources/RuntimeRoot/bin
58267 0 drwxr-xr-x 3 root wheel wheel 96 Dec 3 10:12 /Library/Developer/CoreSimulator/Volumes/iOS_22C150/Library/D
eveloper/CoreSimulator/Profiles/Runtimes/iOS 18.2.simruntime/Contents/Resources/RuntimeRoot/Library/Audio/Plug-Ins/HAL/VirtualAudio.plugin/bg.lproj
66348 0 drwxr-xr-x 3 root wheel wheel 96 Dec 3 10:12 /Library/Developer/CoreSimulator/Volumes/iOS_22C150/Library/D
eveloper/CoreSimulator/Profiles/Runtimes/iOS 18.2.simruntime/Contents/Resources/RuntimeRoot/Library/Wallpaper/Mercury/Pro24-J717-J718-J720-J721.bundl
e/bg.lproj
59159 0 drwxr-xr-x 3 root wheel wheel 96 Dec 3 10:12 /Library/Developer/CoreSimulator/Volumes/iOS_22C150/Library/D
eveloper/CoreSimulator/Profiles/Runtimes/iOS 18.2.simruntime/Contents/Resources/RuntimeRoot/Library/Wallpaper/Collections/Bokeh.wallpaperCollection/b
g.lproj
```

and more.

- `-type d` → Find **directories**.
- `-name "b*"` → Matches names **starting with 'b'**.
- `-ls` → Lists **full details**.

19. Find (and list with full details) all the files of directory '/dev', with name beginning with 'tty'.

```
bash-5.2$ find /dev -type f -name "tty*" -ls
find: /dev/fd/3: Not a directory
find: /dev/fd/4: Not a directory
find: /dev/fd/6: Not a directory
```

20. Sort the contents of file 'ask1.txt' according to 'username' in descending order.

```
bash-5.2$ sort -k3,3r ask1.txt
Vasilis Mamalis vas32 12345 Dafni 9738383
Nick Pappas nick4 11223 Aigaleo 5324123
Nick Nikolaoy nick23 12232 Aigaleo 5314555
Helen Ioannoy helen367 13222 Athens -----
Helen Thanoy helen36 11132 Peristeri 9718345
Helen Georgioy helen3 12136 Peristeri 5748456
George Georgioy george583 11132 Athens -----
George Pappas george2 12136 Peristeri -----
```

- `-k3,3` → Sort by **column 3** (username).
- `r` → Reverse (descending).

21. Sort all the '.c' files of your current directory according to their size.

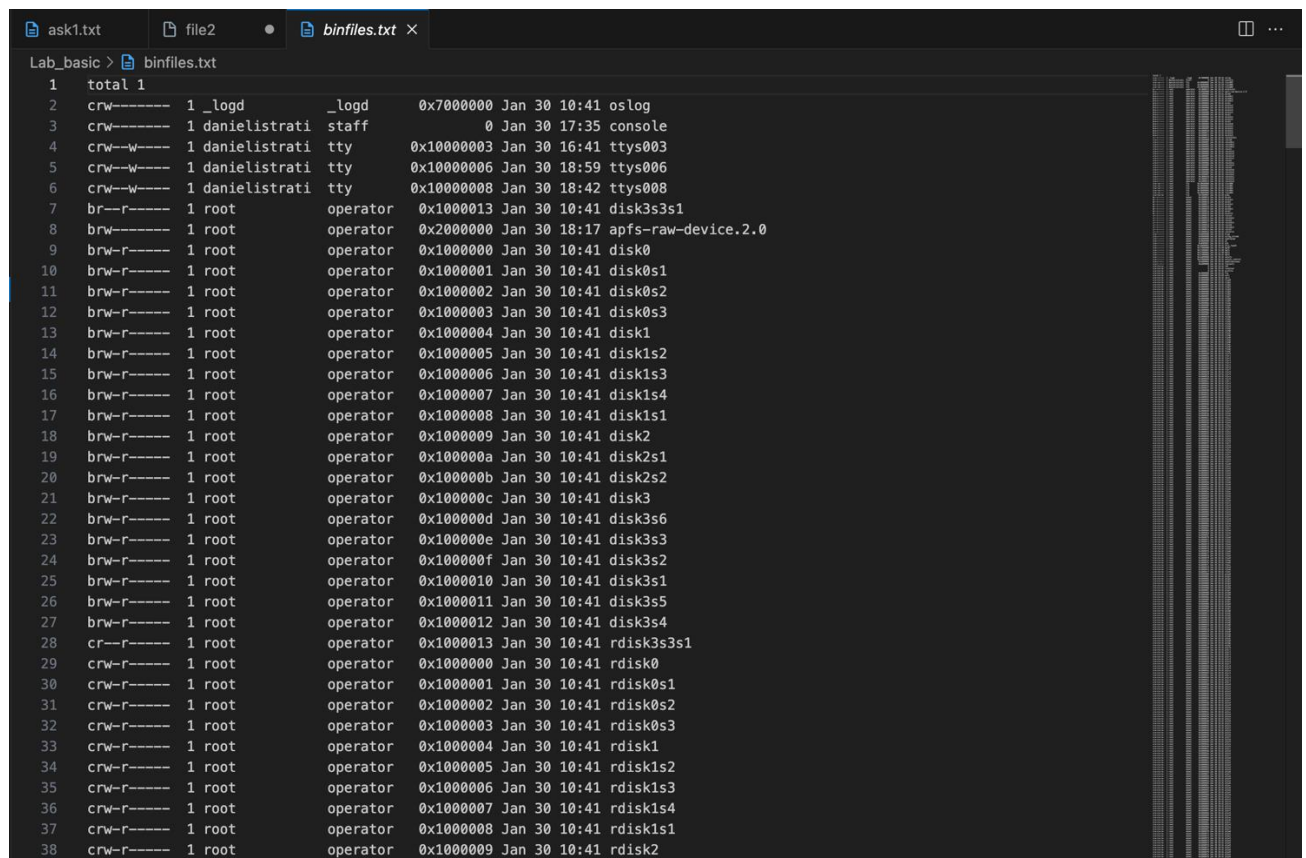
`ls -ls *.c`

22. Sort all the files of your account with permissions 644 according to their size.

```
bash-5.2$ find . -type f -perm 644 -exec ls -lhS {} +
-rw-r--r--@ 1 danielistrati staff 4.5M Jan 30 18:58 ./Istrati_Daniel_Report_Lab_Basic.docx
-rw-r--r--@ 1 danielistrati staff 6.0K Jan 30 17:51 ./DS_Store
-rw-r--r-- 1 danielistrati staff 536B Jan 30 17:15 ./calfile.txt
-rw-r--r-- 1 danielistrati staff 353B Jan 30 18:19 ./ask1.txt
-rw-r--r-- 1 danielistrati staff 311B Jan 30 17:37 ./testdir1/ask1link
-rw-r--r--@ 1 danielistrati staff 162B Jan 30 17:17 ./~$trati_Daniel_Report_Lab_Basic.docx
-rw-r--r-- 1 danielistrati staff 4B Jan 30 17:59 ./kat1/file1
-rw-r--r-- 1 danielistrati staff 4B Jan 30 17:59 ./kat1/file2
-rw-r--r-- 1 danielistrati staff 4B Jan 30 18:01 ./kat1/kat1/file1
-rw-r--r-- 1 danielistrati staff 4B Jan 30 18:01 ./kat1/kat1/file2
```

23. Sort all the contents of directory '/dev', firstly according to the owner and secondly according to the group, and save the output in file 'binfiles.txt'.

```
ls -l /dev | sort -k3,3 -k4,4 > binfiles.txt
```



```
Lab_basic > binfiles.txt
1 total 1
2 crw----- 1 _logd      _logd      0x7000000 Jan 30 10:41 oslog
3 crw----- 1 danielistrati staff      0 Jan 30 17:35 console
4 crw-w----- 1 danielistrati tty       0x10000003 Jan 30 16:41 ttys003
5 crw-w----- 1 danielistrati tty       0x10000006 Jan 30 18:59 ttys006
6 crw-w----- 1 danielistrati tty       0x10000008 Jan 30 18:42 ttys008
7 br--r----- 1 root      operator  0x1000013 Jan 30 10:41 disk3s3s1
8 brw-r----- 1 root      operator  0x2000000 Jan 30 18:17 apfs-raw-device.2.0
9 brw-r----- 1 root      operator  0x1000000 Jan 30 10:41 disk0
10 brw-r----- 1 root      operator  0x1000001 Jan 30 10:41 disk0s1
11 brw-r----- 1 root      operator  0x1000002 Jan 30 10:41 disk0s2
12 brw-r----- 1 root      operator  0x1000003 Jan 30 10:41 disk0s3
13 brw-r----- 1 root      operator  0x1000004 Jan 30 10:41 disk1
14 brw-r----- 1 root      operator  0x1000005 Jan 30 10:41 disk1s2
15 brw-r----- 1 root      operator  0x1000006 Jan 30 10:41 disk1s3
16 brw-r----- 1 root      operator  0x1000007 Jan 30 10:41 disk1s4
17 brw-r----- 1 root      operator  0x1000008 Jan 30 10:41 disk1s1
18 brw-r----- 1 root      operator  0x1000009 Jan 30 10:41 disk2
19 brw-r----- 1 root      operator  0x100000a Jan 30 10:41 disk2s1
20 brw-r----- 1 root      operator  0x100000b Jan 30 10:41 disk2s2
21 brw-r----- 1 root      operator  0x100000c Jan 30 10:41 disk3
22 brw-r----- 1 root      operator  0x100000d Jan 30 10:41 disk3s6
23 brw-r----- 1 root      operator  0x100000e Jan 30 10:41 disk3s3
24 brw-r----- 1 root      operator  0x100000f Jan 30 10:41 disk3s2
25 brw-r----- 1 root      operator  0x1000010 Jan 30 10:41 disk3s1
26 brw-r----- 1 root      operator  0x1000011 Jan 30 10:41 disk3s5
27 brw-r----- 1 root      operator  0x1000012 Jan 30 10:41 disk3s4
28 cr--r----- 1 root      operator  0x1000013 Jan 30 10:41 rdisk3s3s1
29 crw-r----- 1 root      operator  0x1000000 Jan 30 10:41 rdisk0
30 crw-r----- 1 root      operator  0x1000001 Jan 30 10:41 rdisk0s1
31 crw-r----- 1 root      operator  0x1000002 Jan 30 10:41 rdisk0s2
32 crw-r----- 1 root      operator  0x1000003 Jan 30 10:41 rdisk0s3
33 crw-r----- 1 root      operator  0x1000004 Jan 30 10:41 rdisk1
34 crw-r----- 1 root      operator  0x1000005 Jan 30 10:41 rdisk1s2
35 crw-r----- 1 root      operator  0x1000006 Jan 30 10:41 rdisk1s3
36 crw-r----- 1 root      operator  0x1000007 Jan 30 10:41 rdisk1s4
37 crw-r----- 1 root      operator  0x1000008 Jan 30 10:41 rdisk1s1
38 crw-r----- 1 root      operator  0x1000009 Jan 30 10:41 rdisk2
```

24. Create a file containing details for all the users that are connected to the system and their username begins with 'os1', sorted according to their connection date and time.

```
who | grep '^os1' | sort -k4,5 > users.txt
```

file is empty

25. Change (giving the proper command) all the occurrences of name 'Nick' in file 'ask1.txt' to 'Nickolaos'.

```
sed -i "s/\bNick\b/Nickolaos/g" ask1.txt
```

- \bNick\b → Matches **exact** word Nick (not Nickolaou).
- g → Replace **all** occurrences.

```
ask1.txt x file2
Lab_basic > ask1.txt
1 George Pappas george2 12136 Peristeri -----
2 Nickolaos Nikolaou nick23 12232 Aigaleo 5314555
3 George Georgiyo george583 11132 Athens -----
4 Helen Georgiyo helen3 12136 Peristeri 5748456
5 Nickolaos Pappas nick4 11223 Aigaleo 5324123
6 Helen Ioannoy helen367 13222 Athens -----
7 Helen Thanoy helen36 11132 Peristeri 9718345
8 Vasilis Mamalis vas32 12345 Dafni 9738383
```

26. Suppose you have the following file system items, with protection strings: (α) '-rwxr-x--x', (β) 'drwxr-x---' and (γ) 'drwx--x--x'. Explain what type of file system items they are, and which are the (for each of them) the permissions for the 'user', the 'group' and the 'others'.

(α) Regular file (-) (β) Directory (d) (γ) Directory (d)

The following table describes the given file system items, their types, and permissions for the **user**, **group**, and **others**.

File Type	Permissions	User (Owner)	Group	Others
(α) -rwxr-x--x	Regular file	Read, Write, Execute (rwx)	Read, Execute (r-x)	Execute Only (--x)
(β) drwxr-x---	Directory	Read, Write, Execute (rwx)	Read, Execute (r-x)	No Access (---)
(γ) drwx--x--x	Directory	Read, Write, Execute (rwx)	Execute Only (--x)	Execute Only (--x)

27. Change the permissions of all the files of the directory 'testdir1', so that only the owner (user) has permission to execute and write, and everybody has permission to read.

```
chmod 644 testdir1/*
```

**Result:** Owner: rw-, Group: r--, Others: r--.

```
bash-5.2$ chmod 644 testdir1/*
bash-5.2$ ls -l
total 11192
-rw-rw-r--@ 1 danielistrati staff 211324 Oct 21 11:21 Erasmus_OS1_Lab_basic.pdf
-rw-r--r--@ 1 danielistrati staff 5475114 Jan 30 19:00 Istrati_Daniel_Report_Lab_Basic.docx
-rw-r--r-- 1 danielistrati staff 362 Jan 30 19:02 ask1.txt
-rw-r--r-- 1 danielistrati staff 25612 Jan 30 18:59 binfiles.txt
-rw-r--r-- 1 danielistrati staff 536 Jan 30 17:15 calfile.txt
drwxr-xr-x 5 danielistrati staff 160 Jan 30 18:01 kat1
drwxr-xr-x 3 danielistrati staff 96 Jan 30 17:37 testdir1
-rw-r--r-- 1 danielistrati staff 0 Jan 30 19:00 users.txt
-rw-r--r--@ 1 danielistrati staff 162 Jan 30 17:17 ~$trati_Daniel_Report_Lab_Basic.docx
```

28. Change the permissions of the directory 'testdir1', so that only the owner (user) and the group have permission to access (none else - suppose that the current permissions of the directory are 755).

```
chmod 770 testdir1
```

**Result:** User: rwx, Group: rwx, Others: --- (no access).



```

bash-5.2$ chmod 770 testdir1
bash-5.2$ ls -l
total 11824
-rw-rw-r--@ 1 danielistrati staff 211324 Oct 21 11:21 Erasmus_OS1_Lab_basic.pdf
-rw-r--r--@ 1 danielistrati staff 5798452 Jan 30 19:17 Istrati_Daniel_Report_Lab_Basic.docx
-rw-r--r-- 1 danielistrati staff 362 Jan 30 19:02 ask1.txt
-rw-r--r-- 1 danielistrati staff 25612 Jan 30 18:59 binfiles.txt
-rw-r--r-- 1 danielistrati staff 536 Jan 30 17:15 calfile.txt
drwxr-xr-x 5 danielistrati staff 160 Jan 30 18:01 kat1
drwxrwx--- 3 danielistrati staff 96 Jan 30 17:37 testdir1
-rw-r--r-- 1 danielistrati staff 0 Jan 30 19:00 users.txt
-rw-r--r--@ 1 danielistrati staff 162 Jan 30 17:17 ~$trati_Daniel_Report_Lab_Basic.docx

```

30. Let's have the following (by executing the corresponding commands):

user1@localhost:~\$ w

USER	TTY	FROM	LOGIN@	IDLE	JCPU	PCPU	WHAT
user1	pts/0	1.2.3.4	03:34	0.00s	0.38s	0.01s	w
user2	pts/1	5.6.7.8	03:45	0.00s	0.38s	0.01s	ls
user3	pts/2	9.7.5.3	03:57	0.00s	0.38s	0.01s	ps

user1@localhost:~\$ ls -al /dev/pts/\*

crw--w---- 1 user1 tty 136, 0 Oct 25 04:04 /dev/pts/0

crw--w--w- 1 user2 tty 136, 1 Oct 25 04:04 /dev/pts/1

crw--w--w- 1 user3 tty 136, 2 Oct 25 04:04 /dev/pts/2

Explain what is the type of the above file system items.

Explain also what will be the result of the following commands:

user1@localhost:~\$ cat > /dev/pts/1

user1@localhost:~\$ wall "test"

### File Type (c):

- The c at the beginning indicates these are **character device files**. These files represent devices that transfer data character by character (e.g., terminals, keyboards).

### Permissions:

- The second triplet (e.g., rw-) indicates **user permissions**.
- The third triplet (e.g., w-) indicates **group permissions**.
- The fourth triplet (e.g., w-) indicates **permissions for others**.

### Results of Commands

cat > /dev/pts/1

- This command sends standard input to /dev/pts/1, which represents a **pseudo-terminal** (linked to user2 in this case).
- When executed, any text typed in the terminal after running this command will be sent to the **terminal session associated with pts/1** (used by user2).

wall "test"

- The wall command broadcasts a message ("test") to **all logged-in users** on the system.
- Any user logged into a terminal (like pts/0, pts/1, pts/2) will see the message "Broadcast message from user1@localhost" followed by the message "test".

31. Create the files f1, f2, f3, f4, f5, f6, f7 with the following permissions:

f1, 757  
f2, 313  
f3, 010  
f4, 642  
f5, 551  
f6, 133  
f7, 111

Use the command 'ls -l' in pipe with 'egrep' to find the files that:

- The 'group' has permissions 'r-x'
- The 'user' and the 'others' have exactly the same permissions
- The 'user', the 'group' and the 'others' have the same 'write' permission
- The 'user', the 'group' and the 'others' have the same 'write' and 'execute' permissions
- The 'group' and the 'others' have the same 'read' and 'execute' permissions

```
bash-5.2$ mkdir 31
bash-5.2$ cd 31
bash-5.2$ ls
bash-5.2$ touch f1 f2 f3 f4 f5 f6 f7          # Create empty files
chmod 757 f1                                # Set permissions to 757 for f1
chmod 313 f2                                # Set permissions to 313 for f2
chmod 010 f3                                # Set permissions to 010 for f3
chmod 642 f4                                # Set permissions to 642 for f4
chmod 551 f5                                # Set permissions to 551 for f5
chmod 133 f6                                # Set permissions to 133 for f6
chmod 111 f7                                # Set permissions to 111 for f7
bash-5.2$ ls
f1      f2      f3      f4      f5      f6      f7
```

```
bash-5.2$ ls -l | egrep '^[^ ]{4}r-x'
-rwxr-xrwx 1 danielistrati staff 0 Jan 30 22:33 f1
-r-xr-x--x 1 danielistrati staff 0 Jan 30 22:33 f5
```

```
bash-5.2$ ls -l | egrep '^(.)(.){3})\2$'
bash-5.2$ ls -l | egrep '^.(.w.){3}\1.{3}\1$'
bash-5.2$ ls -l | egrep '^.([wx-]{2}).{3}\1.{3}\1$'
bash-5.2$ ls -l | egrep '^.{4}r.x.{3}r.x$'
```

```
bash-5.2$ ls -l
total 0
-rwxr-xrwx 1 danielistrati staff 0 Jan 30 22:33 f1
--wx--x-wx 1 danielistrati staff 0 Jan 30 22:33 f2
-----x--- 1 danielistrati staff 0 Jan 30 22:33 f3
-rw-r---w- 1 danielistrati staff 0 Jan 30 22:33 f4
-r-xr-x--x 1 danielistrati staff 0 Jan 30 22:33 f5
---x-wx-wx 1 danielistrati staff 0 Jan 30 22:33 f6
---x--x--x 1 danielistrati staff 0 Jan 30 22:33 f7
```