

Homework 1: Linux Command Line Basics

Complete the following tasks by using appropriate Linux commands. For each task, provide:

1. The **command(s)** you used
2. A **brief explanation** of how the command solves the problem
3. Any **output** you generated (screenshots)

Task 1: System Investigation

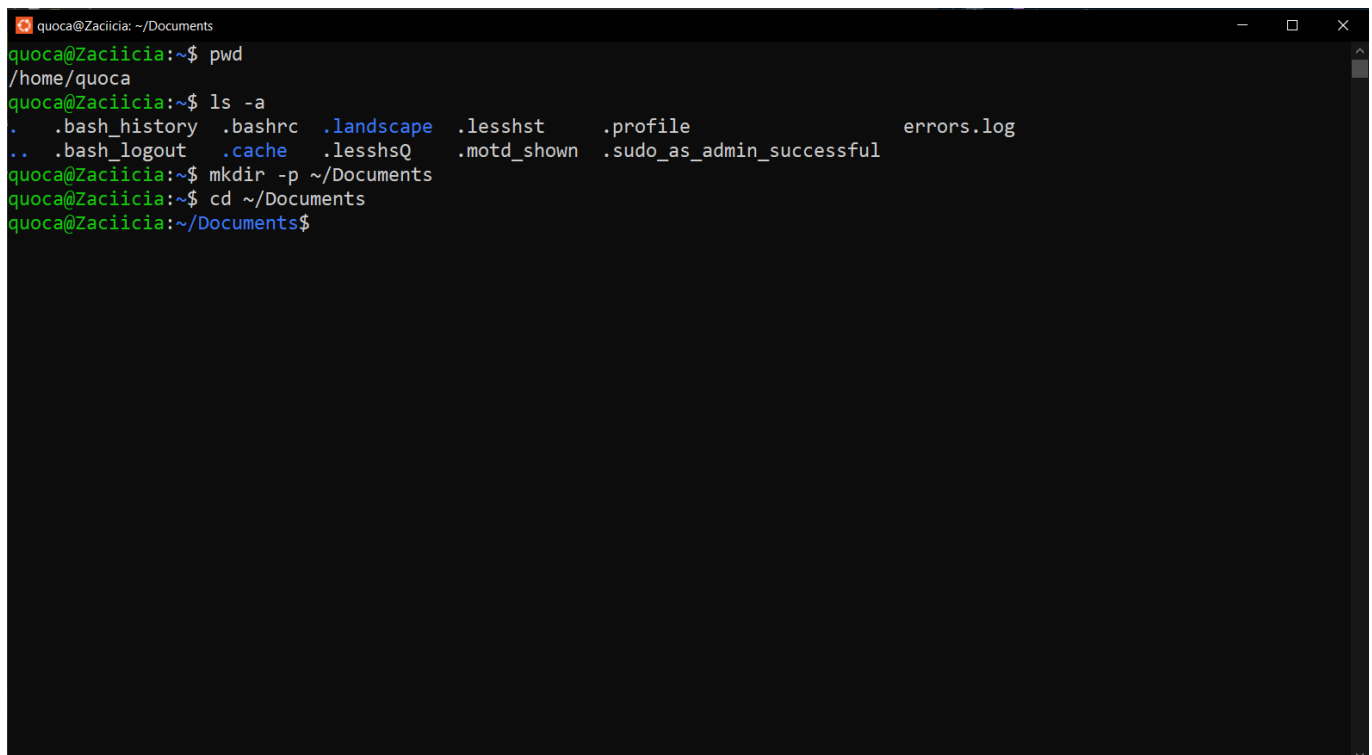
- Find out what directory you are currently in.
- Go to the **Documents** directory inside your home directory using a **relative path**.
- Confirm your new location.

Command(s) used:

```
pwd
ls -a
mkdir -p ~/Documents
cd ~/Documents
pwd
```

Explanation:

- `pwd` shows current working directory.
- `*ls` lists directory contents (which does not have Documents)
- As such, I use `mkdir -p ~/Documents` (flag `-p` create the parent directory if it does not exists) and then `cd ~/Documents` to change directory to Documents
- Again, `pwd` shows current working directory.

A terminal window titled 'quoca@Zaciicia: ~/Documents' showing the execution of the following commands and their output:

```
quoca@Zaciicia:~$ pwd
/home/quoca
quoca@Zaciicia:~$ ls -a
.  .bash_history  .bashrc  .landscape  .lessht  .profile  errors.log
.. .bash_logout  .cache   .lesshtQ   .motd_shown  .sudo_as_admin_successful
quoca@Zaciicia:~$ mkdir -p ~/Documents
quoca@Zaciicia:~$ cd ~/Documents
quoca@Zaciicia:~/Documents$
```

Task 2: Directory Setup

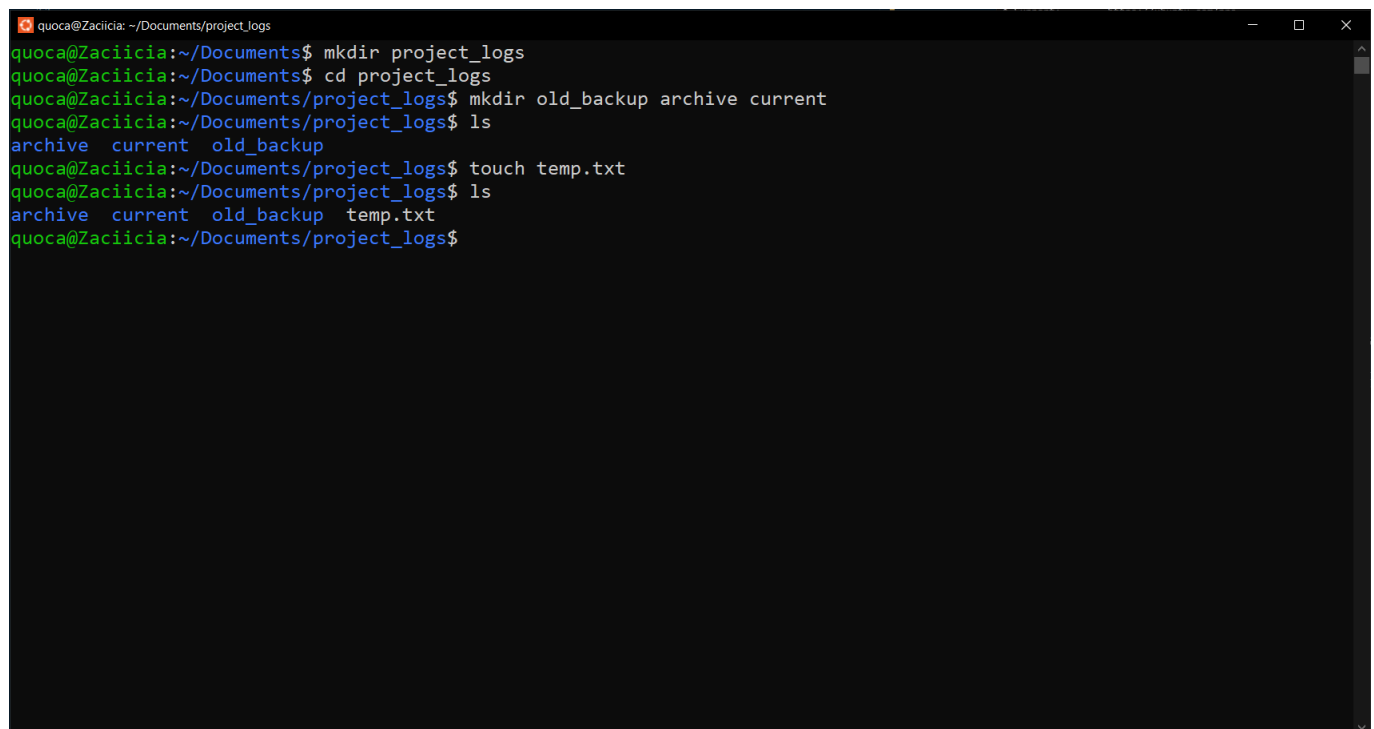
- Create a folder named `project_logs` in your current directory.
- Inside it, create subfolders `old_backup`, `archive`, and `current`. Then, create a file `temp.txt`.
- Verify that they exist.

Command(s) used:

```
mkdir project_logs
cd project_logs
mkdir old_backup archive current
ls
touch temp.txt
ls
```

Explanation:

- `mkdir` create a new directory,
- `ls` lists directory contents (here, for verification),
- `touch` creates a new empty file
- `cat` can be used to view file's content, however there's nothing to view here.

A terminal window with a dark background and light green text. The window title is 'quoca@Zaciicia: ~/Documents/project_logs'. The commands and their outputs are as follows:

```
quoca@Zaciicia:~/Documents$ mkdir project_logs
quoca@Zaciicia:~/Documents$ cd project_logs
quoca@Zaciicia:~/Documents/project_logs$ mkdir old_backup archive current
quoca@Zaciicia:~/Documents/project_logs$ ls
archive  current  old_backup
quoca@Zaciicia:~/Documents/project_logs$ touch temp.txt
quoca@Zaciicia:~/Documents/project_logs$ ls
archive  current  old_backup  temp.txt
quoca@Zaciicia:~/Documents/project_logs$
```

Task 3: Log Review

- You received a system log file at `/var/log/syslog`.
- Display the **last 10 lines** and the **first 5 lines** of the file.
- Reverse the content of the file for a quick scan.

Command(s) used:

```
tail -10 /var/log/syslog
head -5 /var/log/syslog
tac /var/log/syslog | less
```

Explanation:

- *head/tail* views the first/last lines of data
- *-10* and *-5* limits output to said number of lines
- *tac* is the reverse of *cat* (displays file contents from the end to the beginning)
- paging with *less* provides more flexible navigation

```

quoca@Zaciicia: ~
quoca@Zaciicia:~$ tail -10 /var/log/syslog
2025-05-23T09:37:48.697363+07:00 Zaciicia systemd[1]: Cannot find unit for notify message of PID 657, ignoring.
2025-05-23T09:37:48.709317+07:00 Zaciicia systemd[1]: Mounting snap-netbeans-132.mount - Mount unit for netbeans, revisi
on 132...
2025-05-23T09:37:48.725563+07:00 Zaciicia systemd[1]: Mounted snap-netbeans-132.mount - Mount unit for netbeans, revisio
n 132.
2025-05-23T09:37:49.737761+07:00 Zaciicia snapd[174]: storehelpers.go:916: cannot refresh snap "netbeans": snap has no u
pdates available
2025-05-23T09:38:02.066754+07:00 Zaciicia wsl-pro-service[179]: #033[36mINFO#033[0m Daemon: connecting to Windows Agent
2025-05-23T09:38:02.067558+07:00 Zaciicia wsl-pro-service[179]: #033[37mDEBUG#033[0m Updated systemd status to "Connecti
ng"
2025-05-23T09:38:02.068337+07:00 Zaciicia wsl-pro-service[179]: #033[33mWARNING#033[0m Daemon: could not connect to Wind
ows Agent: could not get address: could not read agent port file "/mnt/c/Users/quoca/.ubuntupro/.address": open /mnt/c/U
sers/quoca/.ubuntupro/.address: no such file or directory
2025-05-23T09:38:02.068394+07:00 Zaciicia wsl-pro-service[179]: #033[36mINFO#033[0m Reconnecting to Windows host in 32 s
econds
2025-05-23T09:38:02.068453+07:00 Zaciicia wsl-pro-service[179]: #033[37mDEBUG#033[0m Updated systemd status to "Not conn
ected: waiting to retry"
2025-05-23T09:38:02.152907+07:00 Zaciicia systemd[1]: systemd-timedated.service: Deactivated successfully.
quoca@Zaciicia:~$ head -5 /var/log/syslog
2025-05-19T10:35:10.072987+07:00 Zaciicia systemd-sysctl[69]: Couldn't write '1' to 'kernel/apparmor_restrict_unprivileg
ed_users', ignoring: No such file or directory
2025-05-19T10:35:10.073120+07:00 Zaciicia systemd-sysctl[69]: Couldn't write '176' to 'kernel/sysrq', ignoring: No such
file or directory
2025-05-19T10:35:10.073131+07:00 Zaciicia systemd-sysctl[69]: Couldn't write '1' to 'kernel/yama/ptrace_scope', ignoring
: No such file or directory
2025-05-19T10:35:10.073135+07:00 Zaciicia kernel: Linux version 5.15.167.4-microsoft-standard-WSL2 (root@f9c826d3017f) (
gcc (GCC) 11.2.0, GNU ld (GNU Binutils) 2.37) #1 SMP Tue Nov 5 00:21:55 UTC 2024
2025-05-19T10:35:10.073136+07:00 Zaciicia systemd[1]: Finished keyboard-setup.service - Set the console keyboard layout.
quoca@Zaciicia:~$

quoca@Zaciicia: ~
2025-05-20T14:50:42.737329+07:00 Zaciicia wsl-pro-service[153]: #033[37mDEBUG#033[0m Updated systemd status to "Not conn
ected: waiting to retry"
2025-05-20T14:50:42.737307+07:00 Zaciicia wsl-pro-service[153]: #033[36mINFO#033[0m Reconnecting to Windows host in 60 s
econds
2025-05-20T14:50:42.737271+07:00 Zaciicia wsl-pro-service[153]: #033[33mWARNING#033[0m Daemon: could not connect to Wind
ows Agent: could not get address: could not read agent port file "/mnt/c/Users/quoca/.ubuntupro/.address": open /mnt/c/U
sers/quoca/.ubuntupro/.address: no such file or directory
2025-05-20T14:50:42.735258+07:00 Zaciicia wsl-pro-service[153]: #033[37mDEBUG#033[0m Updated systemd status to "Connecti
ng"
2025-05-20T14:50:42.735137+07:00 Zaciicia wsl-pro-service[153]: #033[36mINFO#033[0m Daemon: connecting to Windows Agent
2025-05-20T14:49:42.677576+07:00 Zaciicia wsl-pro-service[153]: #033[37mDEBUG#033[0m Updated systemd status to "Not conn
ected: waiting to retry"
2025-05-20T14:49:42.677564+07:00 Zaciicia wsl-pro-service[153]: #033[36mINFO#033[0m Reconnecting to Windows host in 60 s
econds
2025-05-20T14:49:42.677522+07:00 Zaciicia wsl-pro-service[153]: #033[33mWARNING#033[0m Daemon: could not connect to Wind
ows Agent: could not get address: could not read agent port file "/mnt/c/Users/quoca/.ubuntupro/.address": open /mnt/c/U
sers/quoca/.ubuntupro/.address: no such file or directory
2025-05-20T14:49:42.675114+07:00 Zaciicia wsl-pro-service[153]: #033[37mDEBUG#033[0m Updated systemd status to "Connecti
ng"
2025-05-20T14:49:42.675007+07:00 Zaciicia wsl-pro-service[153]: #033[36mINFO#033[0m Daemon: connecting to Windows Agent
2025-05-20T14:48:42.616563+07:00 Zaciicia wsl-pro-service[153]: #033[37mDEBUG#033[0m Updated systemd status to "Not conn
ected: waiting to retry"
2025-05-20T14:48:42.616535+07:00 Zaciicia wsl-pro-service[153]: #033[36mINFO#033[0m Reconnecting to Windows host in 60 s
econds
2025-05-20T14:48:42.616475+07:00 Zaciicia wsl-pro-service[153]: #033[33mWARNING#033[0m Daemon: could not connect to Wind
ows Agent: could not get address: could not read agent port file "/mnt/c/Users/quoca/.ubuntupro/.address": open /mnt/c/U
sers/quoca/.ubuntupro/.address: no such file or directory
2025-05-20T14:48:42.613747+07:00 Zaciicia wsl-pro-service[153]: #033[37mDEBUG#033[0m Updated systemd status to "Connecti
ng"
:

```

Task 4: Pattern Search

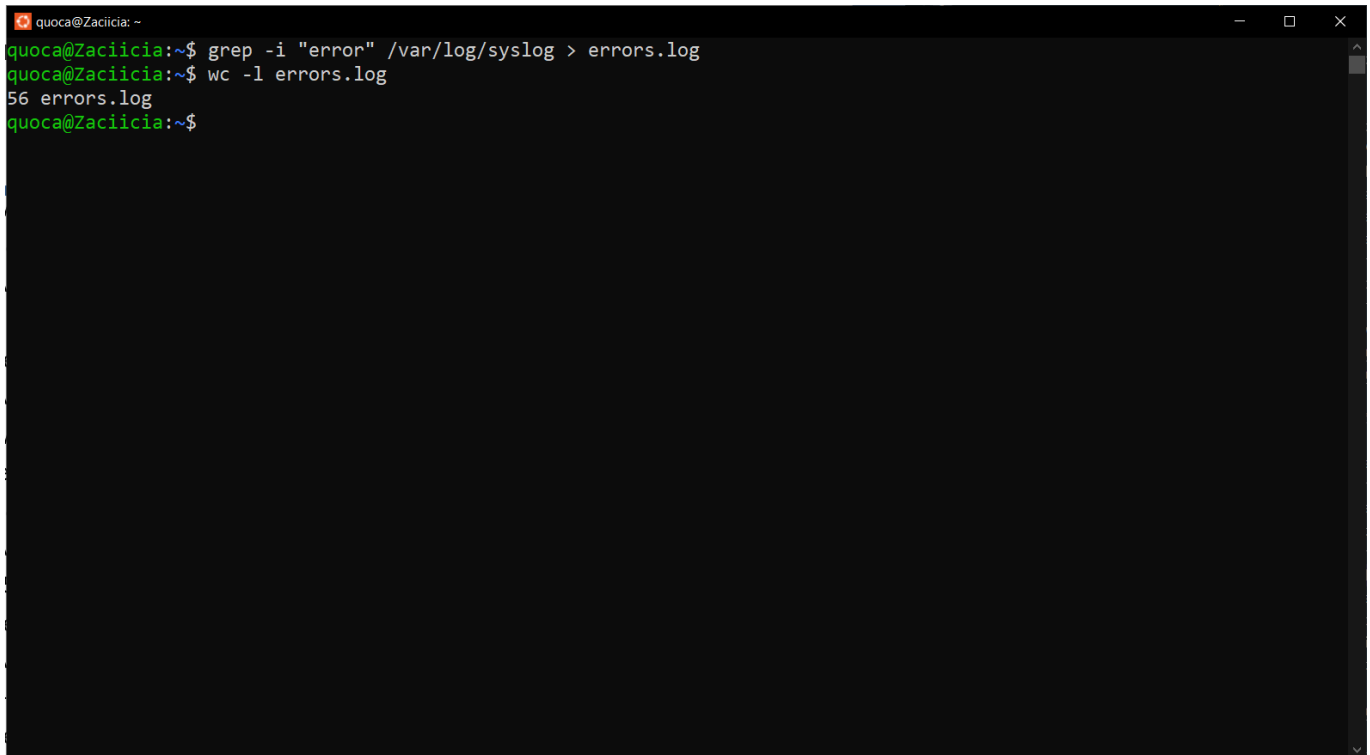
- Search for all lines that contain the word error (case-insensitive).
- Save only these lines to a file called errors.log.
- Count how many such lines exist.

Command(s) used:

```
grep -i "error" /var/log/syslog > errors.log  
wc -l errors.log
```

Explanation:

- *grep* to search content
- flag *-i* to case-insensitive search for "error"
- *>* sends output to errors.log
- *wc -l* counts lines in errors.log

A terminal window with a dark background and light green text. The prompt is 'quoca@Zaciicia: ~'. The first command entered is 'grep -i "error" /var/log/syslog > errors.log'. The second command is 'wc -l errors.log', which outputs '56 errors.log'. The prompt returns to 'quoca@Zaciicia: ~\$'.

```
quoca@Zaciicia: ~  
quoca@Zaciicia:~$ grep -i "error" /var/log/syslog > errors.log  
quoca@Zaciicia:~$ wc -l errors.log  
56 errors.log  
quoca@Zaciicia:~$
```

Task 5: Stream Redirection

- Redirect the list of all files in /etc into a file named etc_list.txt without showing it on screen.
- Append the list of files from /bin to the same file.
- View the result one page at a time.

Command(s) used:

```
ls /etc > etc_list.txt  
ls /bin >> etc_list.txt
```

Explanation:

- *ls* lists directory contents (here, for verification),
- *>* sends output to etc_list.txt
- *>>* appends output to etc_list.txt
- paging with *less* provides more flexible navigation

```
quoca@Zaciicia: ~/Documents/project_logs
quoca@Zaciicia:~/Documents/project_logs$ ls /etc > etc_list.txt
quoca@Zaciicia:~/Documents/project_logs$ ls /bin >> etc_list.txt
quoca@Zaciicia:~/Documents/project_logs$
```

```
quoca@Zaciicia: ~/Documents/project_logs
PackageKit
X11
adduser.conf
alternatives
apparmor
apparmor.d
apport
apt
bash.bashrc
bash_completion
bash_completion.d
bindresvport.blacklist
binfmt.d
byobu
ca-certificates
ca-certificates.conf
cloud
console-setup
credstore
credstore.encrypted
cron.d
cron.daily
cron.hourly
cron.monthly
cron.weekly
cron.yearly
crontab
dbus-1
dconf
etc_list.txt
```

Task 6: Text Processing Create a file users.txt with the following content:

Alice:Admin
Bob:User
Carol:Guest

- Use cut or awk to extract just the usernames.
- Use tr to convert them to lowercase.
- Use sort to display them in reverse alphabetical order.

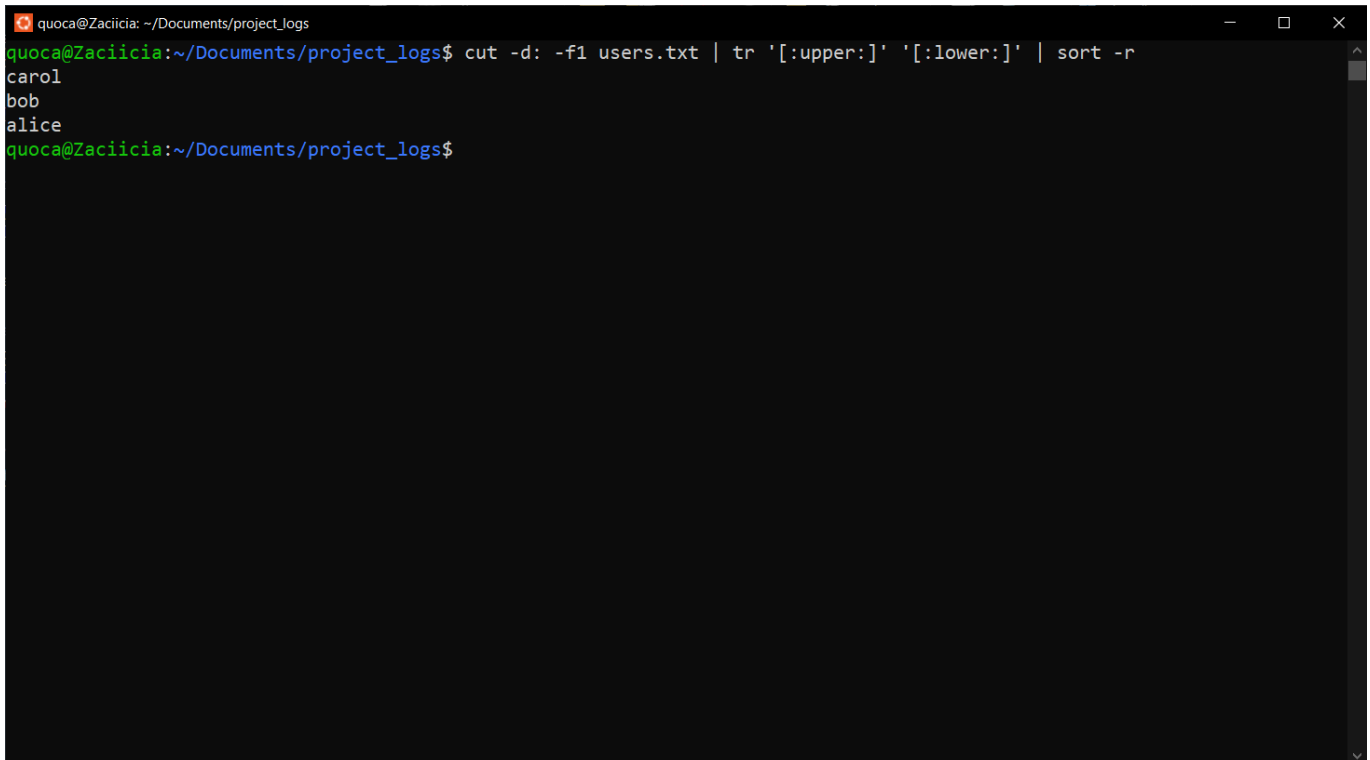
Command(s) used:

```
echo -e "1 Alice:Admin\n2 Bob:User\n3 Carol:Guest" > users.txt cut -d: -f1 users.txt | tr '[:upper:]' '[:lower:]' |
```

sort -r

Explanation:

- *echo* prints a string to the screen
- flag *-e* enables *\n* to create new lines
- flag *-d* sets colon as delimiter
- flag *-f1* selects first field (username)
- *tr '[:upper:]' '[:lower:]'* converts them to lowercase
- flag *-r* displays in reverse alphabetical order



```
quoca@Zaciicia: ~/Documents/project_logs
quoca@Zaciicia:~/Documents/project_logs$ cut -d: -f1 users.txt | tr '[:upper:]' '[:lower:]' | sort -r
carol
bob
alice
quoca@Zaciicia:~/Documents/project_logs$
```

Task 7: Cleanup Script

- Remove an empty directory named *old_backup*
- Delete a file named *temp.txt*
- Move a file *report.txt* to the archive folder
- Copy *archive/report.txt* to *current/report_backup.txt*

Command(s) used:

```
rmdir old_backup
rm temp.txt
ls temp.txt
touch report.txt
mv report.txt archive/
ls archive/
mkdir -p current && cp archive/report.txt current/report_backup.txt
```

Explanation:

- *rmdir* deletes an empty directory
- *rm* deletes files

- *mv* moves files to folder (create said folder if it doesn't exist)
- *cp* copies files
- flag *-p* creates the parent directory if it does not exist

```
quoca@Zaciicia: ~/Documents/project_logs
quoca@Zaciicia:~/Documents/project_logs$ rmdir old_backup
rmdir: failed to remove 'old_backup': No such file or directory
quoca@Zaciicia:~/Documents/project_logs$ rm temp.txt
quoca@Zaciicia:~/Documents/project_logs$ ls temp.txt
ls: cannot access 'temp.txt': No such file or directory
quoca@Zaciicia:~/Documents/project_logs$ touch report.txt
quoca@Zaciicia:~/Documents/project_logs$ mv report.txt archive/
quoca@Zaciicia:~/Documents/project_logs$ ls archive/
report.txt
quoca@Zaciicia:~/Documents/project_logs$ mkdir -p current && cp archive/report.txt current/report_backup.txt
quoca@Zaciicia:~/Documents/project_logs$
```

Task 8: File Hunting

- Find all .conf files under /etc
- Find all files with 755 permission in your home directory
- Find all directories under /usr that contain the word lib

Command(s) used:

```
sudo find /etc -type f -name .conf" find -type f -perm 755 sudo find /usr -type d -name *lib
```

Explanation:

- *sudo* to access root permissions
- *find* searches for files and directories
- flag *-type f*: only regular files
- *-name ".conf"* match .conf extension
- *~*: user's home directory
- *-perm 755*: exact permission match (rwxr-xr-x)
- *-type f*: files only (exclude directories)
- *-type d*: directories only
- *lib*: name contains "lib" (case-sensitive)

```
quoca@Zaciicia: ~/Documents/project_logs
quoca@Zaciicia:~/Documents/project_logs$ sudo find /etc -type f -name "*.conf"
```

```
quoca@Zaciicia: ~/Documents/project_logs
/etc/selinux/semanage.conf
/etc/host.conf
/etc/logrotate.conf
/etc/wsl-distribution.conf
/etc/deluser.conf
/etc/nsswitch.conf
/etc/ld.so.conf.d/libc.conf
/etc/ld.so.conf.d/x86_64-linux-gnu.conf
/etc/ld.so.conf.d/ld.wsl.conf
/etc/fonts/fonts.conf
/etc/fonts/conf.avail/57-dejavu-sans.conf
/etc/fonts/conf.avail/58-dejavu-lgc-sans.conf
/etc/fonts/conf.avail/58-dejavu-lgc-serif.conf
/etc/fonts/conf.avail/57-dejavu-serif.conf
/etc/fonts/conf.avail/20-unhint-small-dejavu-sans.conf
/etc/fonts/conf.avail/20-unhint-small-dejavu-sans-mono.conf
/etc/fonts/conf.avail/57-dejavu-sans-mono.conf
/etc/fonts/conf.avail/20-unhint-small-dejavu-lgc-sans.conf
/etc/fonts/conf.avail/20-unhint-small-dejavu-lgc-serif.conf
/etc/fonts/conf.avail/20-unhint-small-dejavu-lgc-sans-mono.conf
/etc/fonts/conf.avail/65-droid-sans-fallback.conf
/etc/fonts/conf.avail/20-unhint-small-dejavu-serif.conf
/etc/fonts/conf.avail/30-droid-noto-mono.conf
/etc/fonts/conf.avail/58-dejavu-lgc-sans-mono.conf
/etc/ldap/ldap.conf
/etc/dhcpd.conf
/etc/depmod.d/ubuntu.conf
/etc/landscape/client.conf
/etc/sensors3.conf
quoca@Zaciicia:~/Documents/project_logs$
```




The image displays two terminal windows stacked vertically. Both windows have a title bar with a red icon and the text 'quoca@Zaciicia: ~/Documents/project_logs'. The top terminal shows the command 'find ~ -type f -perm 755' being entered, with the prompt 'quoca@Zaciicia:~/Documents/project_logs\$' appearing twice. The bottom terminal shows the command 'sudo find /usr -type d -name "*lib"' being entered, with the prompt 'quoca@Zaciicia:~/Documents/project_logs\$' appearing once. Both terminals have a dark background and a light-colored cursor.

```
quoca@Zaciicia: ~/Documents/project_logs
quoca@Zaciicia:~/Documents/project_logs$ find ~ -type f -perm 755
quoca@Zaciicia:~/Documents/project_logs$

quoca@Zaciicia: ~/Documents/project_logs
quoca@Zaciicia:~/Documents/project_logs$ sudo find /usr -type d -name "*lib"
```

```
quoca@Zacicia: ~/Documents/project_logs
/usr/share/doc/libsharpvuv0
/usr/share/doc/libgles2
/usr/share/doc/libpng16-16t64
/usr/share/doc/libperl5.38t64
/usr/share/doc/libv4lconvert0t64
/usr/share/doc/libnspr4
/usr/share/ghostscript/10.02.1/lib
/usr/share/perl/5.38.2/unicore/lib
/usr/share/perl/5.38.2/IO/Compress/Zlib
/usr/share/bug/mesa-libgallium
/usr/share/bug/libgl1-mesa-dri
/usr/share/bug/libglapi-mesa
/usr/share/bug/libmagic1t64
/usr/share/bug/libegl1
/usr/share/bug/libglvnd0
/usr/share/bug/libgl1-amber-dri
/usr/share/bug/libglx-mesa0
/usr/share/bug/libglx0
/usr/share/bug/fonts-liberation-sans-narrow
/usr/share/bug/libgbm1
/usr/share/bug/libegl-mesa0
/usr/share/bug/libgl1
/usr/share/bug/libgtk-3-0t64
/usr/share/bug/fonts-liberation
/usr/share/bug/libgles2
/usr/share/fonts/truetype/liberation
/usr/share/gdb/auto-load/usr/lib
/usr/share/libgedit-gtksourceview-300
/usr/share/maven-repo/org/gnu/gettext/libintl
quoca@Zacicia:~/Documents/project_logs$
```

Task 9: Joining Data

- Create two files:
names.txt:
1 Alice
2 Bob
3 Carol
roles.txt:
1 Admin
2 User
3 Guest
- Join them into one file with both name and role.

Command(s) used:

```
echo -e "1 Alice\n2 Bob\n3 Carol" > names.txt echo -e "1 Admin\n2 User\n3 Guest" > roles.txt join names.txt roles.txt > combined.txt
```

Explanation:

- *echo* prints a string to the screen
- flag *-e* enables *\n* to create new lines
- *join* to join files' contents
- *cat* to print file's content to check

```
quoca@Zaciicia: ~/Documents/project_logs
quoca@Zaciicia:~/Documents/project_logs$ echo -e "1 Alice\n2 Bob\n3 Carol" > names.txt
quoca@Zaciicia:~/Documents/project_logs$ echo -e "1 Admin\n2 User\n3 Guest" > roles.txt
quoca@Zaciicia:~/Documents/project_logs$ join names.txt roles.txt > namesroles.txt
quoca@Zaciicia:~/Documents/project_logs$ cat namesroles.txt
1 Alice Admin
2 Bob User
3 Carol Guest
quoca@Zaciicia:~/Documents/project_logs$
```

Task 10: Line Numbering & Word Counts

- Use `nl` to number the lines of `users.txt`
- Use `wc` to count:
 - Number of lines
 - Number of words
 - Number of bytes in `users.txt`

Command(s) used:

```
echo -e "1 Alice\n2 Bob\n3 Carol" > names.txt
```

Explanation:

- `nl` number the lines of the current directory,
- `wc` prints (in order) number of lines, words & bytes in the the current directory

```
quoca@Zaciicia: ~/Documents/project_logs
quoca@Zaciicia:~$ cd Documents/project_logs
quoca@Zaciicia:~/Documents/project_logs$ nl users.txt
 1 Alice:Admin
 2 Bob:User
 3 Carol:Guest
quoca@Zaciicia:~/Documents/project_logs$ wc users.txt
 3  3 33 users.txt
quoca@Zaciicia:~/Documents/project_logs$
```