Homework 1: Linux Command Line Basics

Môn học: Hệ điều hành Linux và ứng dụng

CS11117 - 22MMT

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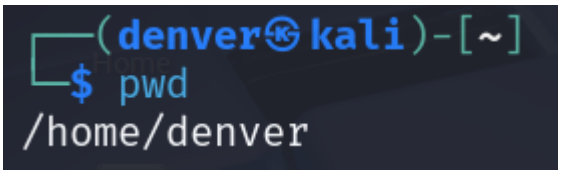
Task 1: System Investigation

> **1. Find out what directory you are currently in.**

```
pwd
```

Explanation:

- `pwd` (print working directory) prints the full path of the current directory. It helps users know their current location in the file system. **Screenshot:**



> **2. Go to the Documents directory inside your home directory using a relative path.**

```
cd ~/Documents
```

Explanation:

- `cd ~/Documents` changes to the `Documents` directory located in the current user's home directory (~ stands for `/home/denver`).

Screenshot:

> **3. Confirm your new location.**

```
pwd
```

Explanation:

- `pwd` is used again to confirm that the new current directory is `/home/denver/Documents`.

Screenshot:

Task 2: Directory Setup

> **1. Create a folder named `project_logs` in your current directory.**

```
mkdir project_logs
```

Explanation:

- `mkdir project_logs` creates a folder named `project_logs` in the current directory..

Screenshot:

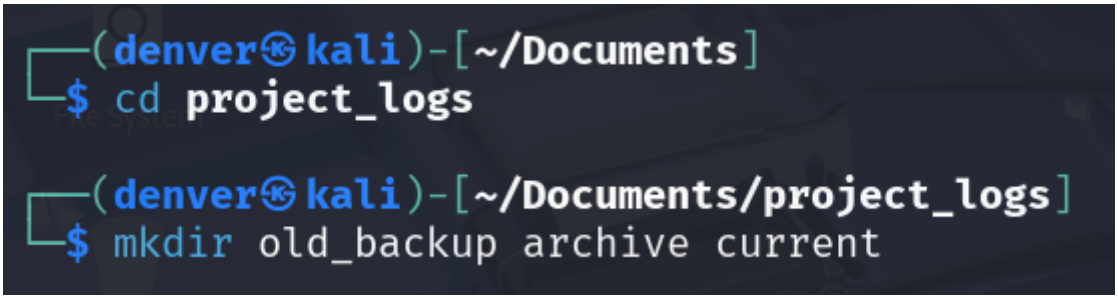
> **2. Inside it, create subfolders `old_backup`, `archive`, and `current`.**

```
cd project_logs
mkdir old_backup archive current
```

Explanation:

- `cd project_logs` navigates into the newly created folder.
- `mkdir old_backup archive current` creates three subfolders at once.

Screenshot:



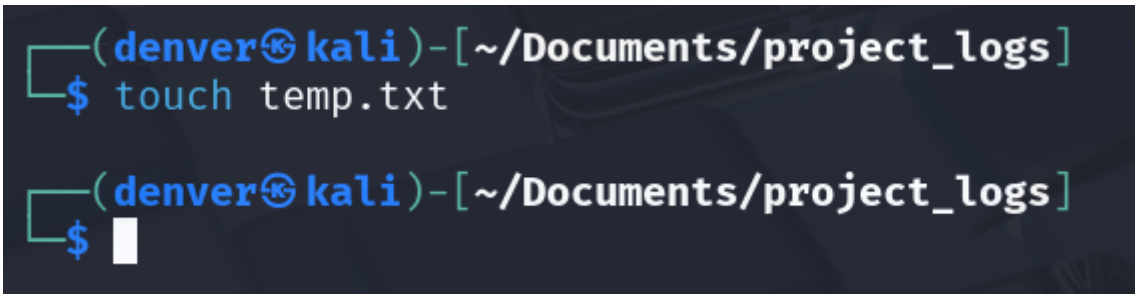
> **3. Then, create a file `temp.txt`.**

```
touch temp.txt
```

Explanation:

- `touch temp.txt` creates an empty file named `temp.txt`.

Screenshot:



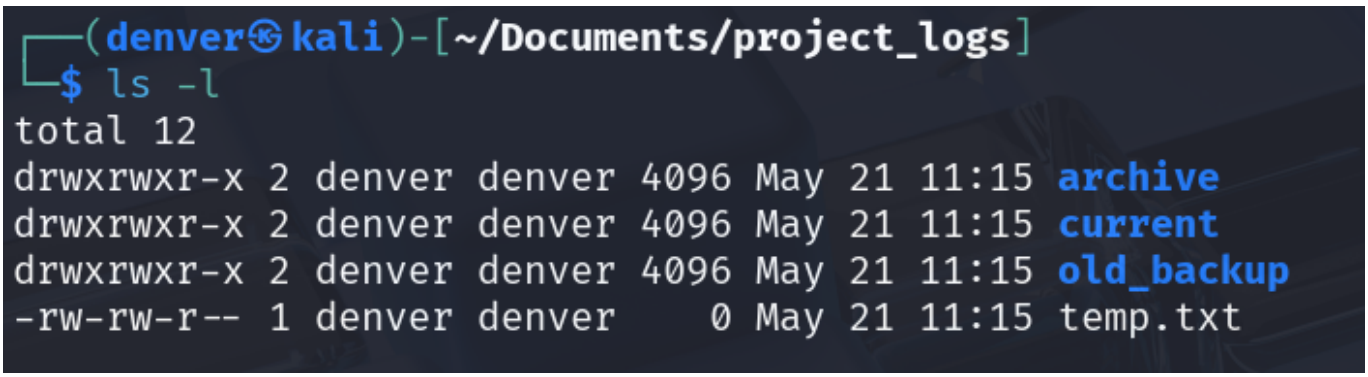
> **4. Verify that they exist.**

```
ls -l
```

Explanation:

- `ls -l` lists the files and directories in detail to confirm they were created successfully.

Screenshot:



Task 3: Log Review

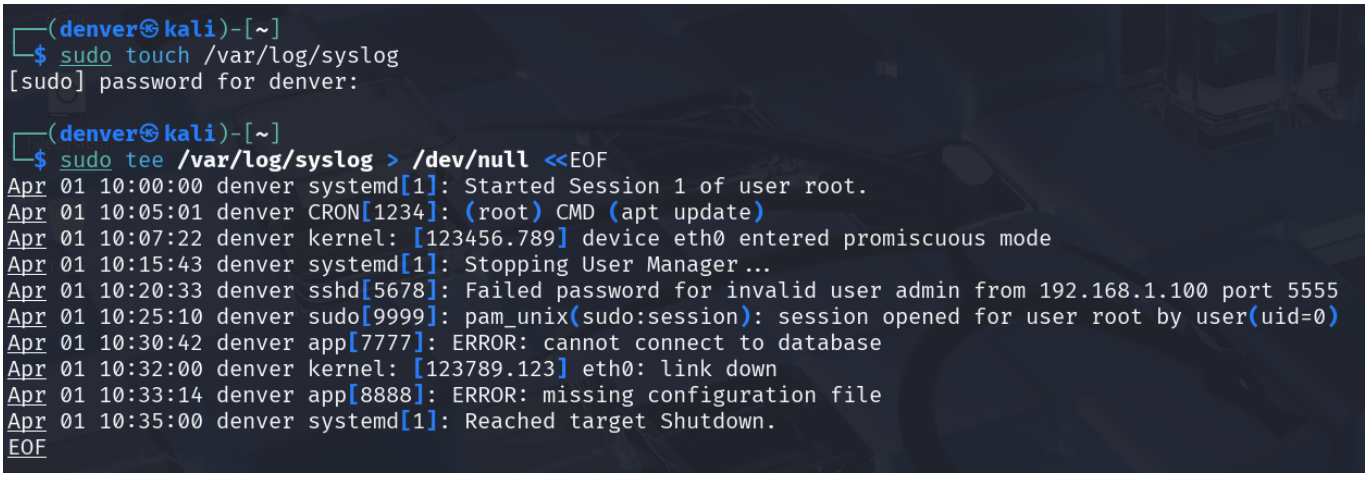
> **1. You received a system log file at `/var/log/syslog`.**

```
sudo touch /var/log/syslog
sudo tee /var/log/syslog > /dev/null <<EOF
```

Explanation:

- `Kali Linux` doesn't have log file at `/var/log/syslog` so I created a temporary file to do this task

Screenshot:



---

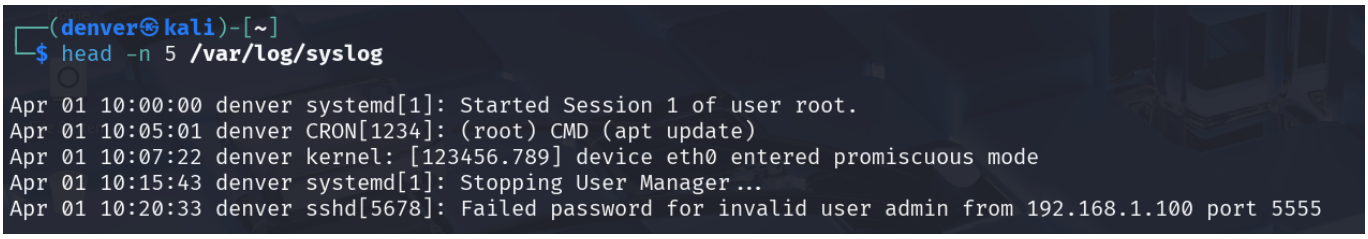
2. Display the first 5 lines of the file.

```
head -n 5 /var/log/syslog
```

Explanation:

- `head -n 5` shows the first 5 lines of the file to give an overview of its beginning.

Screenshot:



---

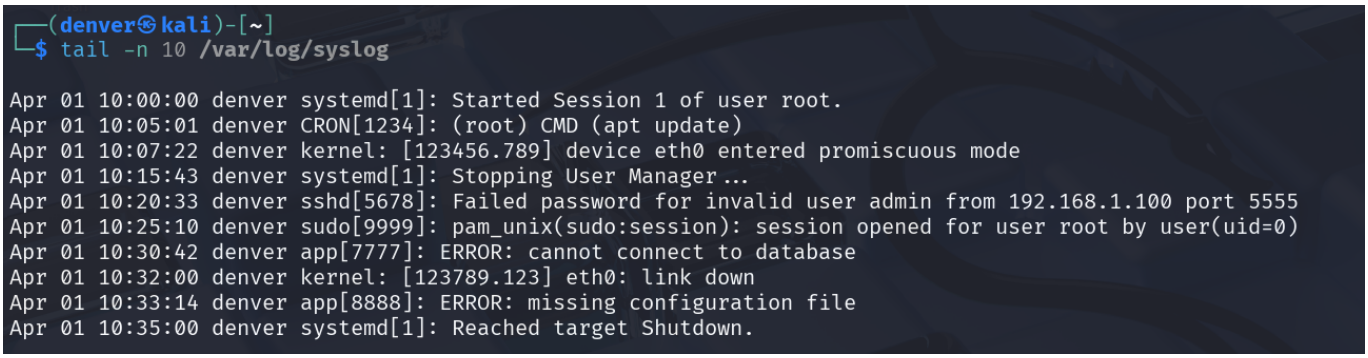
3. Display the last 10 lines of the file.

```
tail -n 10 /var/log/syslog
```

Explanation:

- `tail -n 10` displays the last 10 lines, usually showing the most recent logs.

Screenshot:



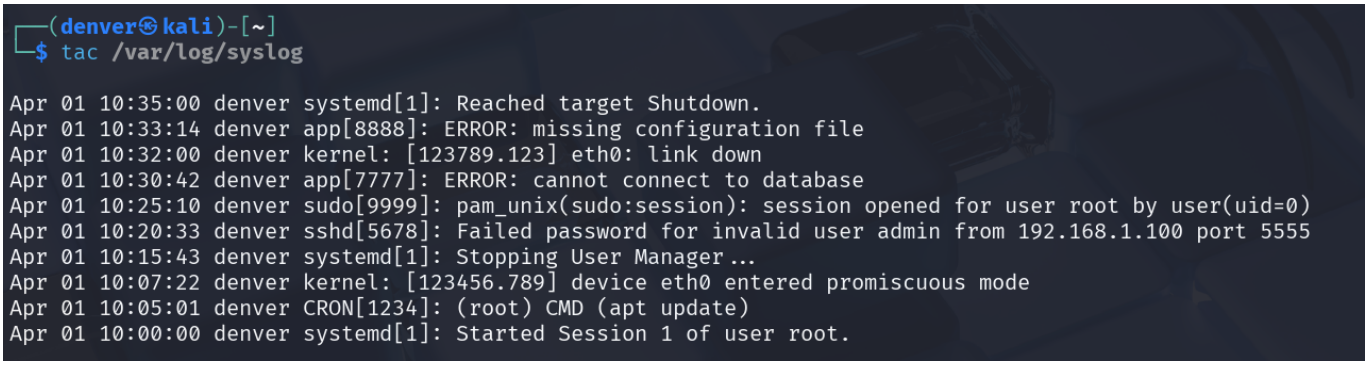
> **4. Reverse the content of the file for a quick scan.**

```
tac /var/log/syslog
```

Explanation:

- `tac` (reverse `cat`) displays the file from bottom to top, which can be helpful when viewing recent logs without scrolling.

Screenshot:



Task 4: Pattern Search

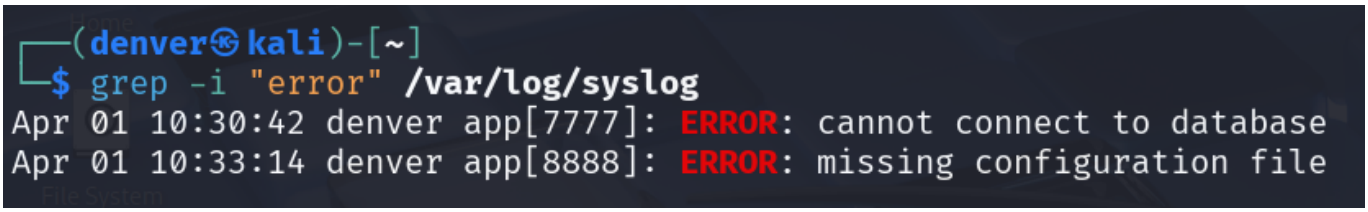
> **1. Search for all lines that contain the word `error` (case-insensitive).**

```
grep -i "error" /var/log/syslog
```

Explanation:

- `grep -i` searches for the word `error` without case sensitivity and redirects the output to `errors.log`.

Screenshot:



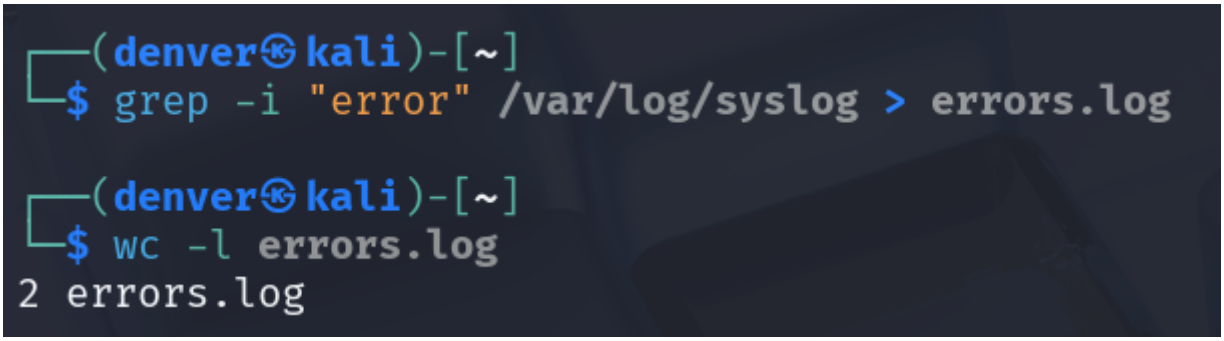
> **2. Count how many such lines exist.**

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

Explanation:

- Redirect the output of `grep -i "error" /var/log/syslog` to `errors.log`.
- `wc -l` counts the number of lines in `errors.log`, which is the number of matching lines.

Screenshot:



Task 5: Stream Redirection

> **1. Redirect the list of all files in `/etc` into a file named `etc_list.txt` without showing it on screen.**

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

Explanation:

- The `ls /etc` list all files in `/etc`.
- The `>` operator saves the output to `etc_list.txt` and does not display it in the terminal.

Screenshot:

> **2. Append the list of files from `/bin` to the same file.**

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

Explanation:

- `>>` appends the output to `etc_list.txt` without overwriting the previous content.

Screenshot:

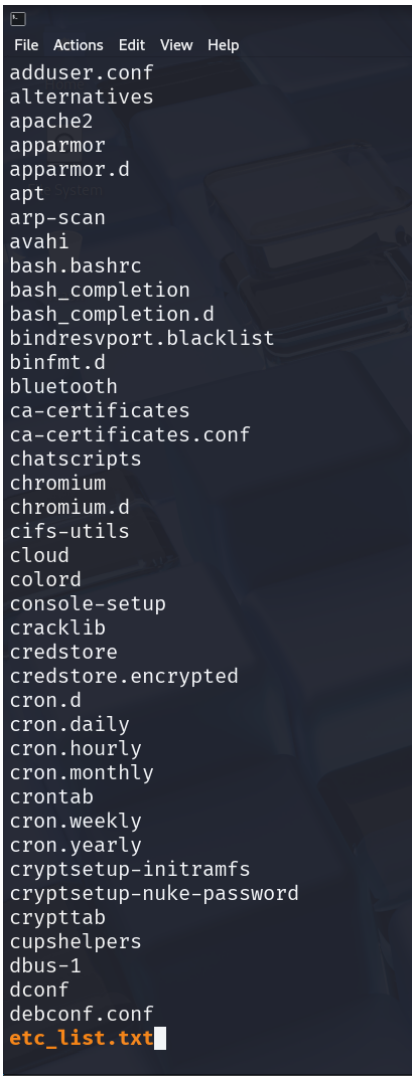
> **3. View the result one page at a time.**

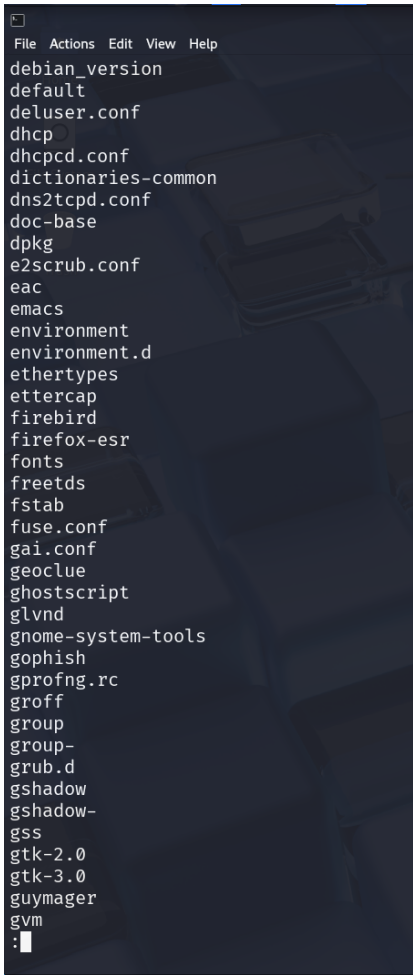
```
less etc_list.txt
```

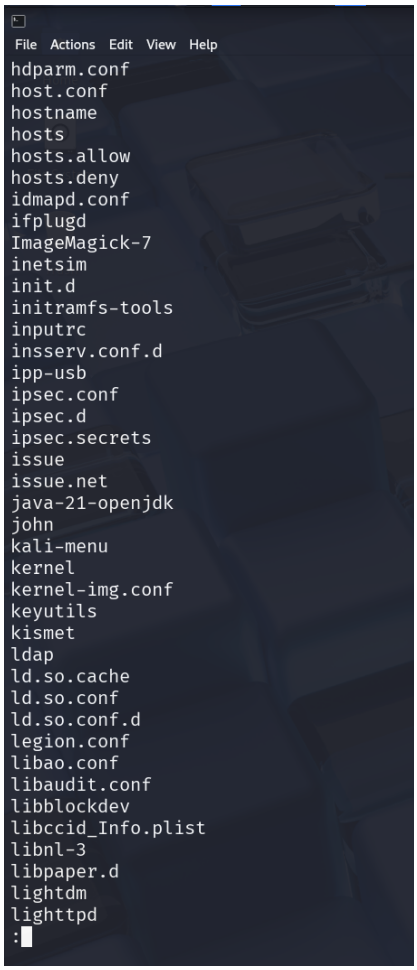
Explanation:

- `less` allows viewing a file one screen at a time with scroll support.

Screenshot: The content of `etc_list.txt` is longer than 3 images below.







Task 6: Text Processing

> **1. Create a file `users.txt` with the content:**
> Alice:Admin
> Bob:User
> Carol:Guest

```
echo -e "Alice:Admin\nBob:User\nCarol:Guest" > users.txt
```

Explanation:

- `echo -e` prints multiple lines into `users.txt`, using `\n` to break lines.

Screenshot:

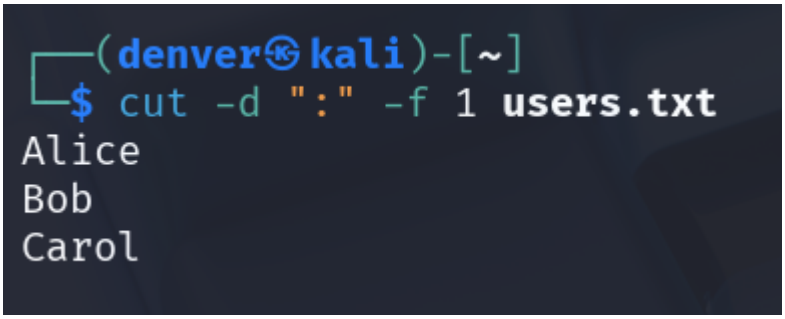
---

2. Use `cut` or `awk` to extract usernames.

```
cut -d ":" -f 1 users.txt
```

Explanation:

- `cut -d ":" -f 1` extracts the part before `:` on each line:
  - `-d` stands for **delimiter**. In this case, the delimiter is a colon `:`, so each line will be split at every `:`.
  - `-f` stands for **field**. `-f 1` means take the first field - the part before the first `:` in each line
  - `users.txt` is the file that contains the data to be processed. **Screenshot:**



---

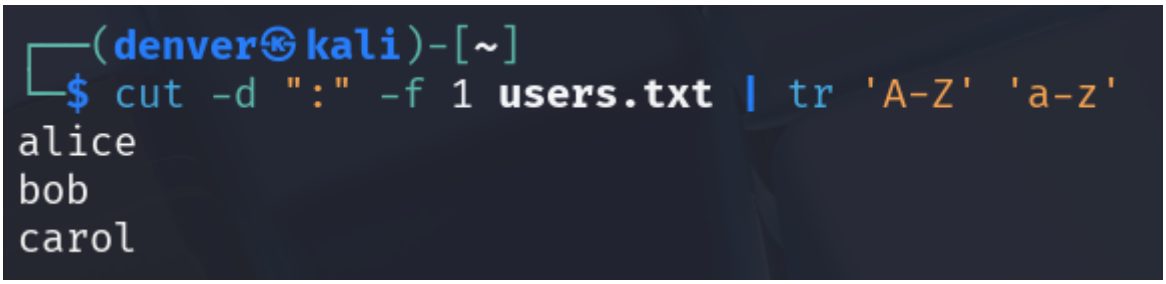
3. Use `tr` to convert them to lowercase.

```
cut -d ":" -f 1 users.txt | tr 'A-Z' 'a-z'
```

Explanation:

- `|` is called the pipe operator. It is used to connect the output of one command to the input of another command.
- `tr 'A-Z' 'a-z'` converts all uppercase letters to lowercase.

Screenshot:



> **4. Use `sort` to display in reverse alphabetical order.**

```
cut -d ":" -f 1 users.txt | tr 'A-Z' 'a-z' | sort -r
```

Explanation:

- `sort -r` sorts the list in reverse alphabetical order (Z to A).

Screenshot:

Task 7: Cleanup Script

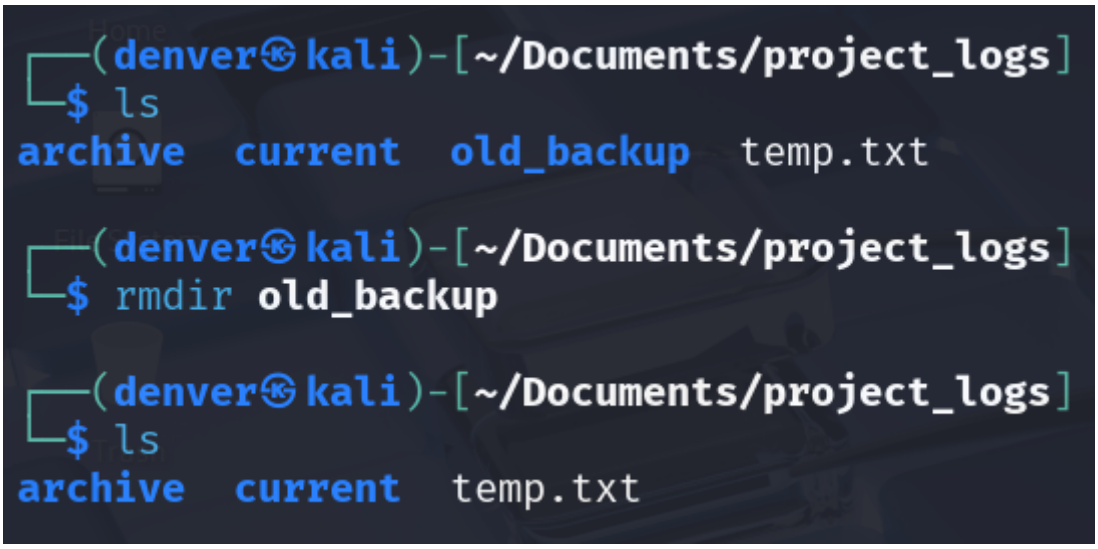
> **1. Remove an empty directory named `old_backup`.**

```
rmdir old_backup
```

Explanation:

- `rmdir` removes empty directories. It will fail if the directory is not empty.

Screenshot:



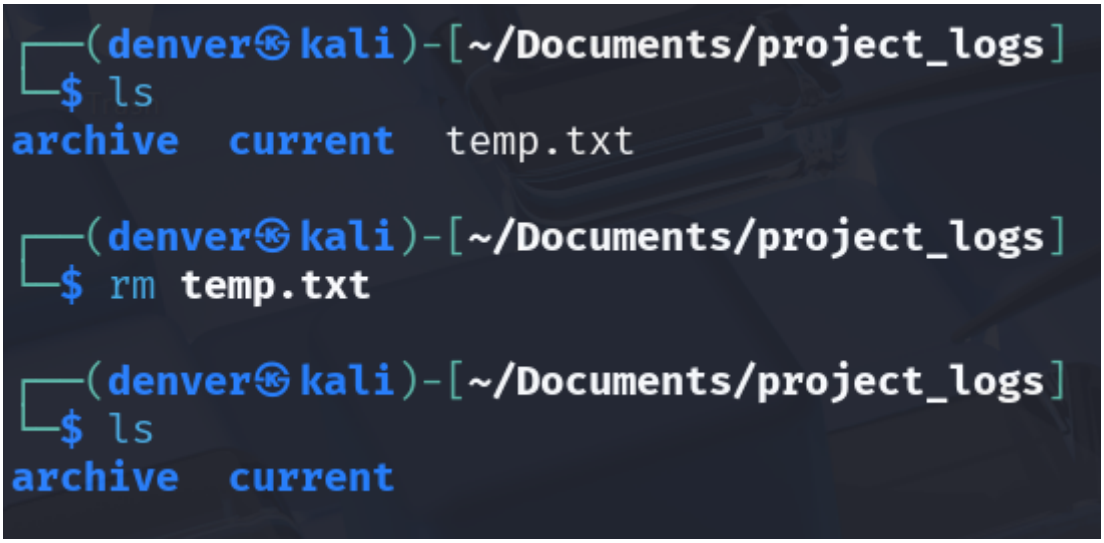
> **2. Delete a file named `temp.txt`.**

```
rm temp.txt
```

Explanation:

- `rm` deletes a file in the Linux system.

Screenshot:



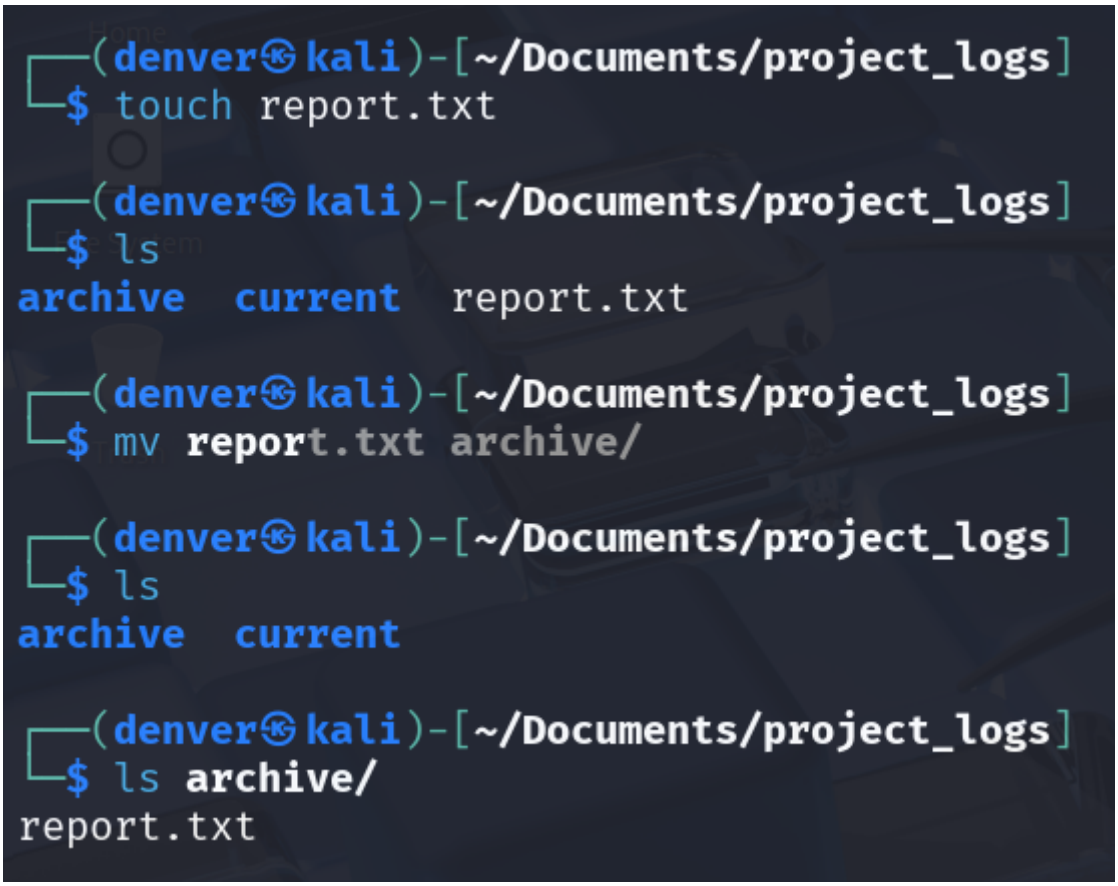
> **3. Move a file `report.txt` to the `archive` folder.**

```
mv report.txt archive/
```

Explanation:

- `mv` moves `report.txt` into the `archive/` folder.

Screenshot:



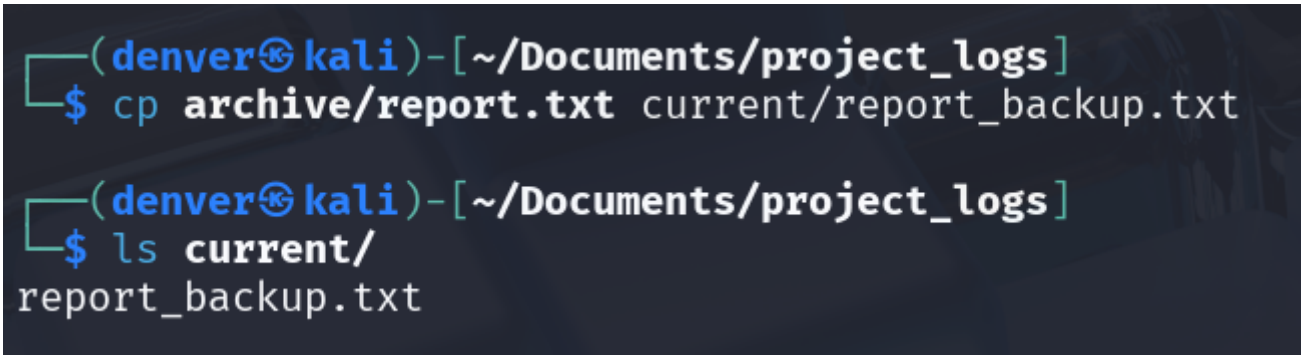
> **4. Copy `archive/report.txt` to `current/report_backup.txt`**

```
cp archive/report.txt current/report_backup.txt
```

Explanation:

- `cp` copies the file from `archive` to `current` with a new name `report_backup.txt`.

Screenshot:



Task 8: File Hunting

> **1. Find all `.conf` files under `/etc`.**

```
find /etc -type f -name "*.conf"
```

Explanation:

- `find` with `-type f` and `-name` finds all files ending in `.conf` under `/etc`:
  - `find` used to search files and directories in a directory hierarchy based on various criteria (name, type, permissions, size, etc.).
  - `/etc` is the starting point of the search.
  - `-type f` limits the search to **files** only.
  - `-name "*.conf` filter the search by **filename pattern**.

Screenshot:

> **2. Find all files with 755 permission in your home directory.**

```
find ~ -type f -perm 755
```

Explanation:

- Searches for files (`-type f`) in the home directory (`~`) with permission `755`:
  - `~` home directory
  - `-perm 755` tells the `find` to match files with specific permission mode:
  - `755` means:
    - Owner: read, write, execute (`7 = rwx`)
    - Group: read, execute (`5 = r-x`)
    - Others: read, execute (`5 = r-x`)

Screenshot:

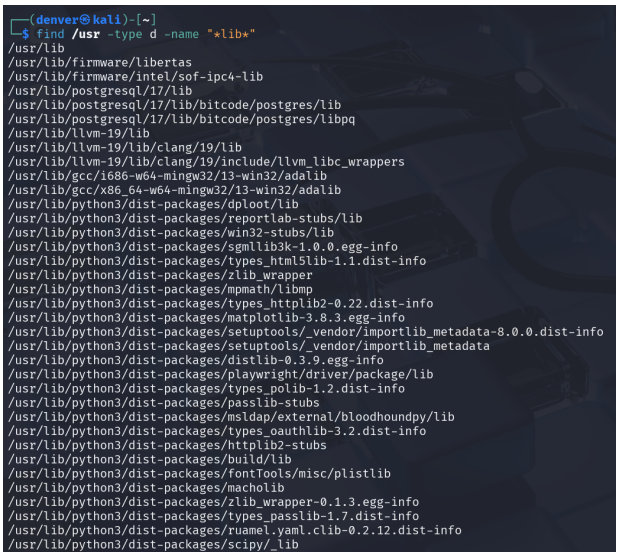
> **3. Find all directories under `/usr` that contain the word `lib`**

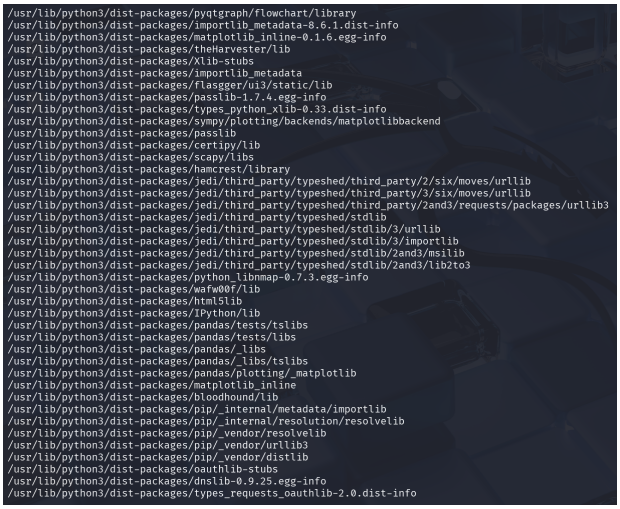
```
find /usr -type d -name "*lib*"
```

Explanation:

- Finds all directories (`-type d`) with names containing `lib` under `/usr`:
  - `-type d` find directories only
  - `*lib*` is a **glob pattern** (wildcard-based string pattern). It means:
    - `*` matches zero of more characters.
    - `lib` is the literal string being searched for
    - `*lib*` matches any name that contains the word `lib` anywhere.

Screenshot:





Task 9: Joining Data

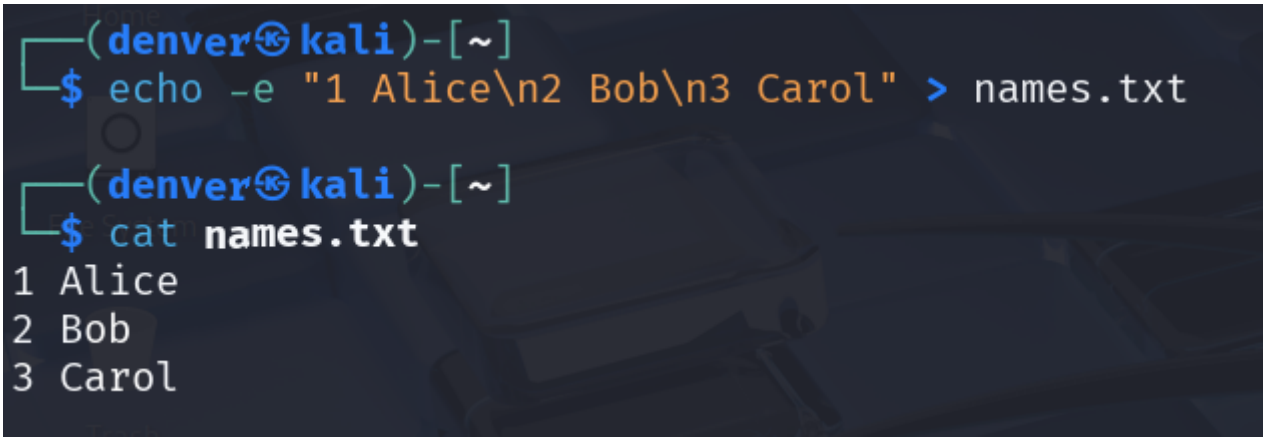
1. Create file `names.txt`

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

Explanation:

- Uses `echo` to simulate a list of IDs and names.

Screenshot:



---

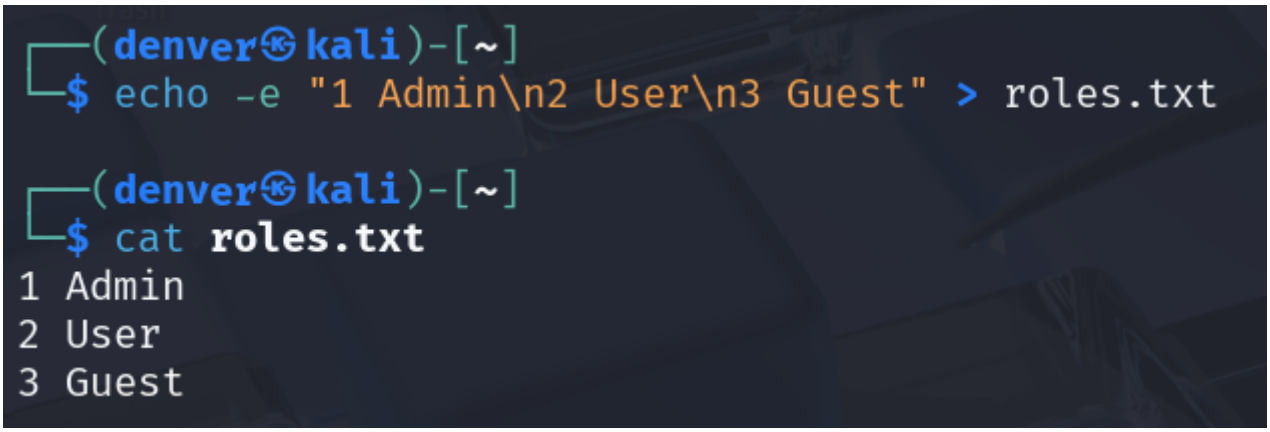
2. Create file `roles.txt`

```
echo -e "1 Admin\n2 User\n3 Guest" > roles.txt
```

Explanation:

- Similar to `names.txt`, but for corresponding roles.

Screenshot:



> **3. Join them into one file with both name and role.**

```
join names.txt roles.txt > names_roles.txt
```

Explanation:

- `join names.txt roles.txt`: merges the two files based on the first field (ID).
- `>` redirects the result into a new file named `names_roles.txt`.

Screenshot:

Task 10: Line Numbering & Word Counts

> **1. Use `nl` to number the lines of `users.txt`**

```
nl users.txt
```

Explanation:

- `nl` stands for number lines. It displays the contents of the file while automatically adding line numbers at the beginning of each line.

Screenshot:

---

2. Use `wc` to count number of lines, words, and bytes

```
wc users.txt
```

Explanation:

- `wc` stands for word count. It provides three statistics for the specified file:
  - Number of lines.
  - Number of words.
  - Number of bytes (or characters).

Screenshot: