

Linux terminal

Introdução Engenharia Informática

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Exercises

Exercise 1: Finding Your Way Around 🧭

This exercise covers `pwd`, `ls`, `cd`, and basic information commands.

1. Open your terminal. Verify your starting location (your home directory) by printing the working directory.

```
$ pwd
```

2. List the contents of your home directory. Then, list them again showing **all** files in the **long** list format.

```
$ ls
$ ls -la
```

3. Navigate to the system log directory at `/var/log` and list its contents.

```
$ cd /var/log
$ ls
```

4. Get some information: find out your username and the current date.

```
$ whoami
$ date
```

5. Return to your home directory using the quickest shortcut.

```
$ cd ~
```

Exercise 2: Exploring Key System Directories 🗺️

Reinforce your knowledge of the filesystem layout by visiting important system directories.

1. Navigate to the `/etc` directory, which holds system-wide configuration files.

```
$ cd /etc
```

2. List its contents. You'll see many configuration files.

```
$ ls
```

3. View the contents of the `os-release` file to see information about your Linux distribution.

```
$ cat os-release
```

4. Now, navigate to the `/bin` directory to see where many essential command programs are stored. List its contents and see if you recognize any.

```
$ cd /bin
$ ls
```

Exercise 3: Creating and Managing Files 📁

In this exercise, you'll create, copy, move, and delete files and directories.

1. From your home directory, create a new directory called IEI.

```
$ cd ~  
$ mkdir IEI
```

2. Navigate inside your new IEI directory.

```
$ cd IEI
```

3. Create an empty file called `notes.txt`.

```
$ touch notes.txt
```

4. Add text to your file and then view its contents.

```
$ echo "My first line of text." > notes.txt  
$ cat notes.txt
```

5. Make a copy of your file named `notes_backup.txt`.

```
$ cp notes.txt notes_backup.txt
```

6. Rename `notes.txt` to `important_notes.txt`.

```
$ mv notes.txt important_notes.txt
```

7. Clean up by deleting the backup file.

```
$ rm notes_backup.txt
```

Exercise 4: Understanding Permissions 🔒

This exercise focuses on reading and changing file permissions with `chmod`.

1. Inside your `~/IEI` directory, create a new file called `secret_data.txt`.

```
$ touch secret_data.txt
```

2. View the file's default permissions.

```
$ ls -l secret_data.txt
```

3. Remove all permissions for everyone.

```
$ chmod 000 secret_data.txt
```

4. Try to view the file's contents. You should get a **"Permission denied"** error.

```
$ cat secret_data.txt
```

5. Restore read and write permission for **only yourself**.

```
$ chmod u+rw secret_data.txt
```

6. Create an empty script file `my_script.sh` and make it executable for yourself. Check the permissions afterward to see the change.

```
$ touch my_script.sh  
$ chmod u+x my_script.sh  
$ ls -l my_script.sh
```

Exercise 5: Finding Files and Content with `find` and `grep` 🔍

Learn to locate files by name and search for text within them.

1. Inside `~/IEI`, create a subdirectory and a new file within it.

```
$ mkdir -p ~/IEI/reports
$ echo "This is a confidential report." > ~/IEI/reports/report-2025.txt
```

2. Use the `find` command to search for any file ending with `.txt` inside your `IEI` directory.

```
$ find ~/IEI -name "*.txt"
```

3. Use `grep` to search for the word “confidential” in your new report file. The `-i` flag makes the search case-insensitive.

```
$ grep -i "confidential" ~/IEI/reports/report-2025.txt
```

Exercise 6: Managing Processes ⚙️

Learn how to view and stop running programs from the command line.

1. Start a process that will run in the background. The `sleep` command waits for a specified number of seconds, and the `&` sends it to the background.

```
$ sleep 120 &
```

2. Find the Process ID (PID) of the `sleep` command. You can use `pgrep` for this.

```
$ pgrep sleep
```

3. Now, terminate the process using the `kill` command and the PID you just found. Replace PID with the actual number from the previous step.

```
$ kill PID
```

4. Verify that the process is no longer running. The `pgrep sleep` command should now return nothing.

```
$ pgrep sleep
```

Exercise 7: Managing Software with APT 📦

Let's install and remove a program using the **APT** package manager.

1. First, synchronize your system's package list with the software repositories.

```
$ sudo apt update
```

2. Search for a useful command-line tool called `htop`.

```
$ apt search htop
```

3. Now, install `htop`. You will need to confirm the installation when prompted.

```
$ sudo apt install htop
```

4. Run the program you just installed. Press `q` to quit.

```
$ htop
```

5. Finally, clean up by removing the package from your system.

```
$ sudo apt remove htop
```

Exercise 8: Combining Commands

Let's explore the power of the **pipe** (|) and **redirection** (>>).

1. The command `ps aux` lists all running processes. Use the pipe (|) to send this output to `grep` to find your own "bash" process.

```
$ ps aux | grep "bash"
```

2. Create a log file with one entry.

```
$ echo "$(date): Starting my work." > ~/IEI/activity.log
```

3. Use the append operator (>>) to add a second line to the file without deleting the first one.

```
$ echo "$(date): Finished exercise 8." >> ~/IEI/activity.log
```

4. Verify that your log file contains both lines.

```
$ cat ~/IEI/activity.log
```

Exercise 9: Customizing Your Environment ✨

Time to edit your `.bashrc` file to create a handy shortcut (an alias).

1. Open your `~/ .bashrc` file using the `nano` editor.

```
$ nano ~/.bashrc
```

2. Scroll to the very bottom and add the following line to create a shortcut `ll` for the command `ls -alF`.

```
alias ll='ls -alF'
```

3. Save the file and exit `nano` (Ctrl+X, then Y, then Enter).

4. Load the changes into your current session.

```
$ source ~/.bashrc
```

5. Test your new alias.

```
$ ll
```

Exercise 10: Understanding the \$PATH Variable

Discover how the shell finds the commands you run.

1. View the current `$PATH` variable. It's a colon-separated list of directories.

```
$ echo $PATH
```

2. Create a simple one-line script in your `~/IEI` directory and make it executable.

```
$ echo '#!/bin/bash' > ~/IEI/hello
$ echo 'echo "Hello from my custom script!"' >> ~/IEI/hello
$ chmod +x ~/IEI/hello
```

3. Try to run the script by name. It will fail because it's not in a directory listed in `$PATH`.

```
$ hello
```

4. Now run it using its relative path. This works.

```
$ ./hello
```

5. Temporarily add your `~/IEI` directory to the `$PATH`. Now try running the script by name again.

```
$ export PATH="$HOME/IEI:$PATH"
$ hello
```

This change only lasts for your current terminal session.

Exercise 11: Scripting Challenge 🚀

Let's create a script that automates creating a project structure.

1. Create and open a new file named `setup_project.sh` in your `~/IEI` directory. Add the following code, then save and close the file.

```
#!/bin/bash
PROJECT_DIR="$HOME/IEI/my_project"

if [ -d "$PROJECT_DIR" ]; then
    echo "Error: Directory '$PROJECT_DIR' already exists."
    exit 1
fi

mkdir "$PROJECT_DIR"
echo "Directory '$PROJECT_DIR' created."

for folder in assets source docs
do
    mkdir "$PROJECT_DIR/$folder"
    echo "-> Created subfolder: $folder"
done

echo "Project setup complete!"
```

2. Make the script executable and then run it.

```
$ chmod +x ~/IEI/setup_project.sh
$ ~/IEI/setup_project.sh
```

3. Verify that the directory and its subdirectories were created.

```
$ ls -R ~/IEI/my_project
```

Exercise 12: Scheduling a Task with cron 🕒

Let's create a simple script and schedule it to run automatically every minute.

1. **Create the Script:** In your `~/IEI` directory, create a script named `log_time.sh` with the following content.

```
#!/bin/bash
date >> $HOME/IEI/cron_log.txt
```

2. **Make it Executable:**

```
$ chmod +x ~/IEI/log_time.sh
```

3. **Open your Crontab:** This will open a text editor.

```
$ crontab -e
```

4. **Add the Cron Job:** Go to the bottom of the file and add the following line. You must use the full, absolute path to your script.

```
* * * * * /home/student/IEI/log_time.sh
```

5. **Save and Verify:** Save and exit the editor. Wait two minutes, then check your log file. You should see two timestamp entries.

```
$ cat ~/IEI/cron_log.txt
```

6. **Clean Up:** It's very important to remove the cron job so it doesn't run forever. This command removes your entire crontab file.

```
$ crontab -r
```