

Metodi Computazionali per la Fisica

Linux e Uso del Terminale

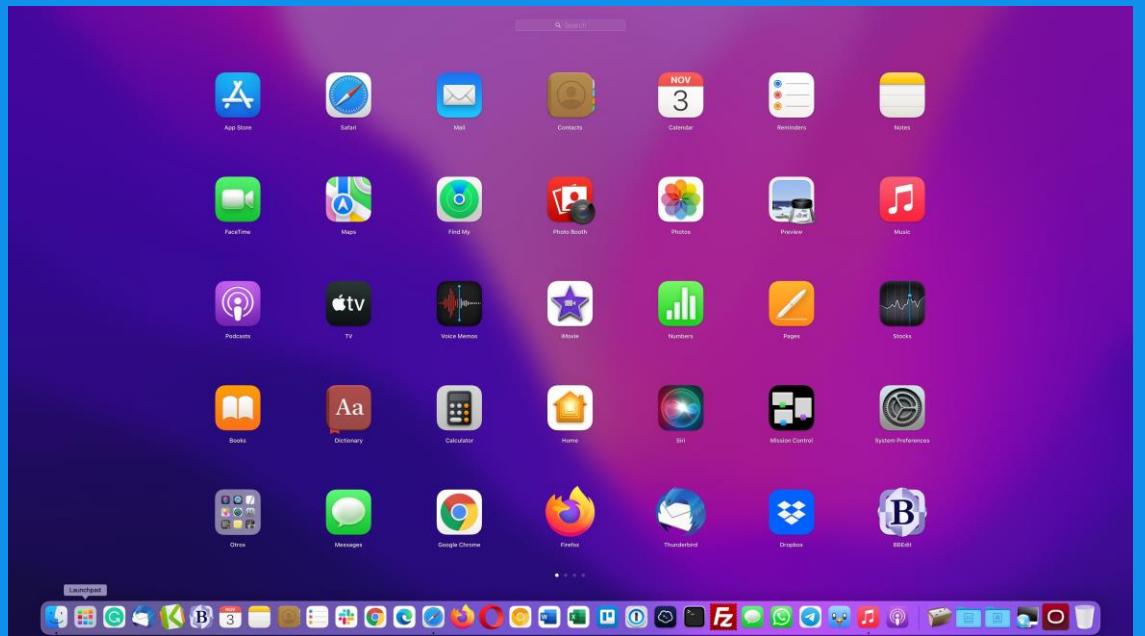
S. Germani – stefano.germani@unipg.it

Sistemi Operativi

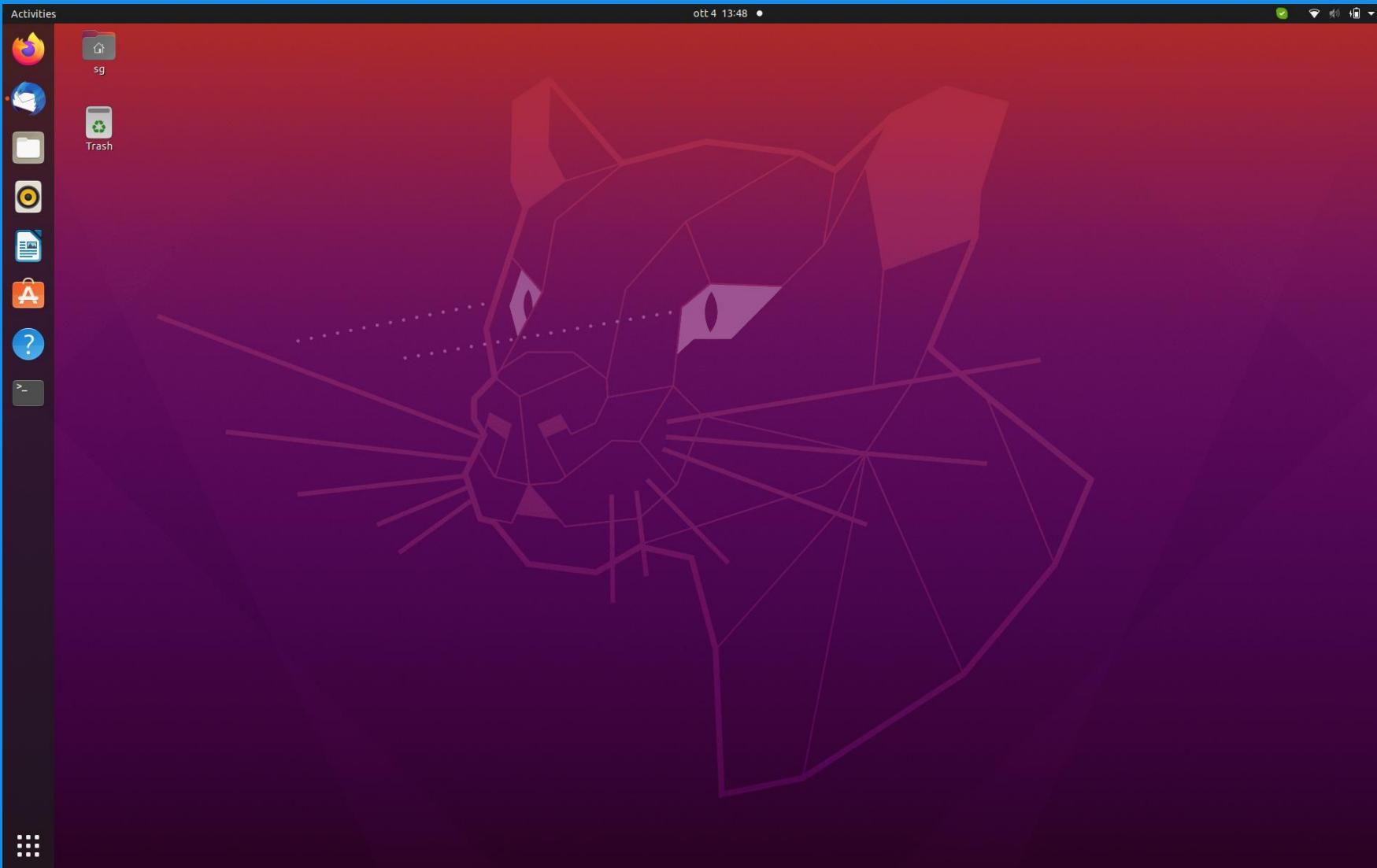
MS Windows



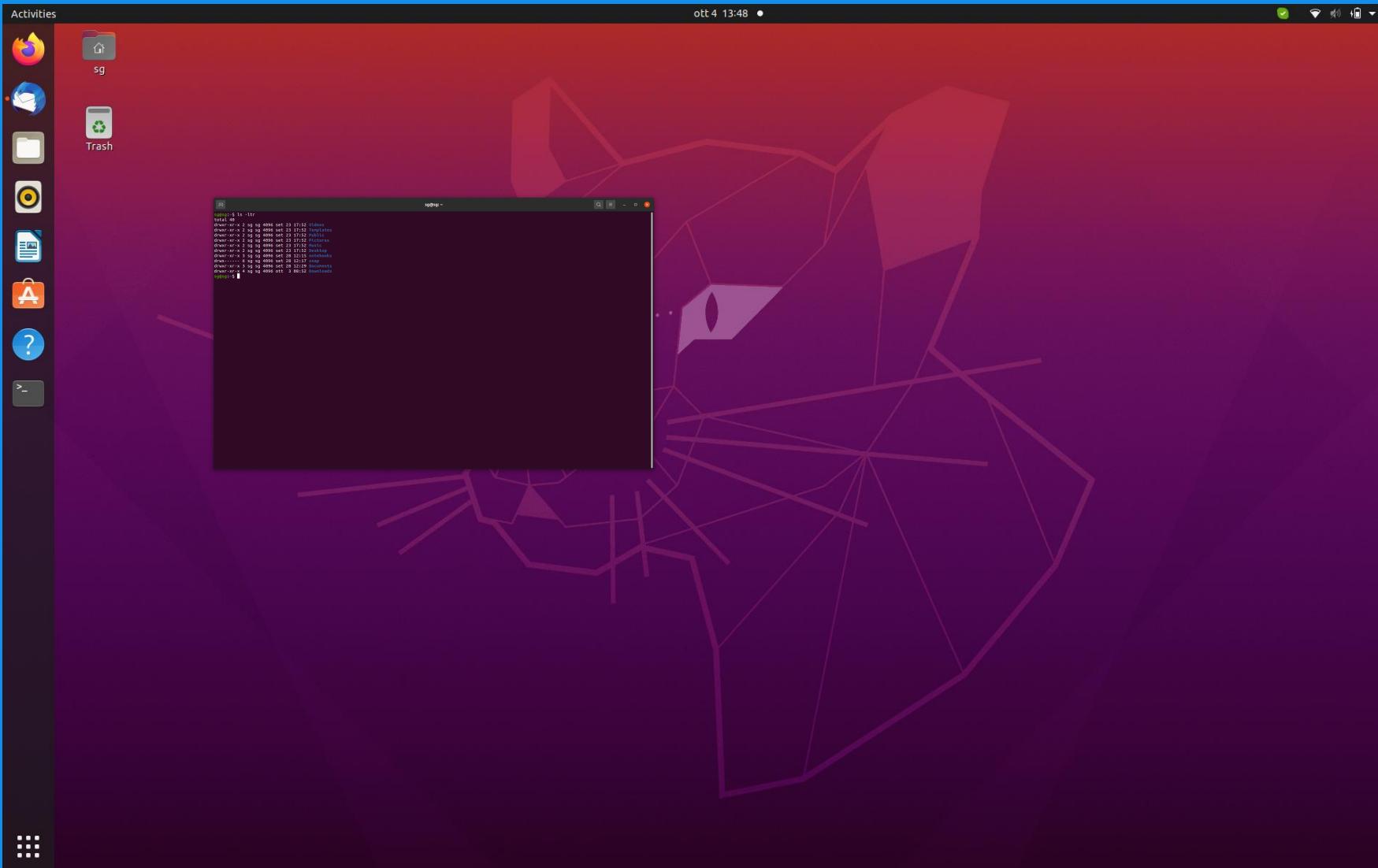
Mac OS



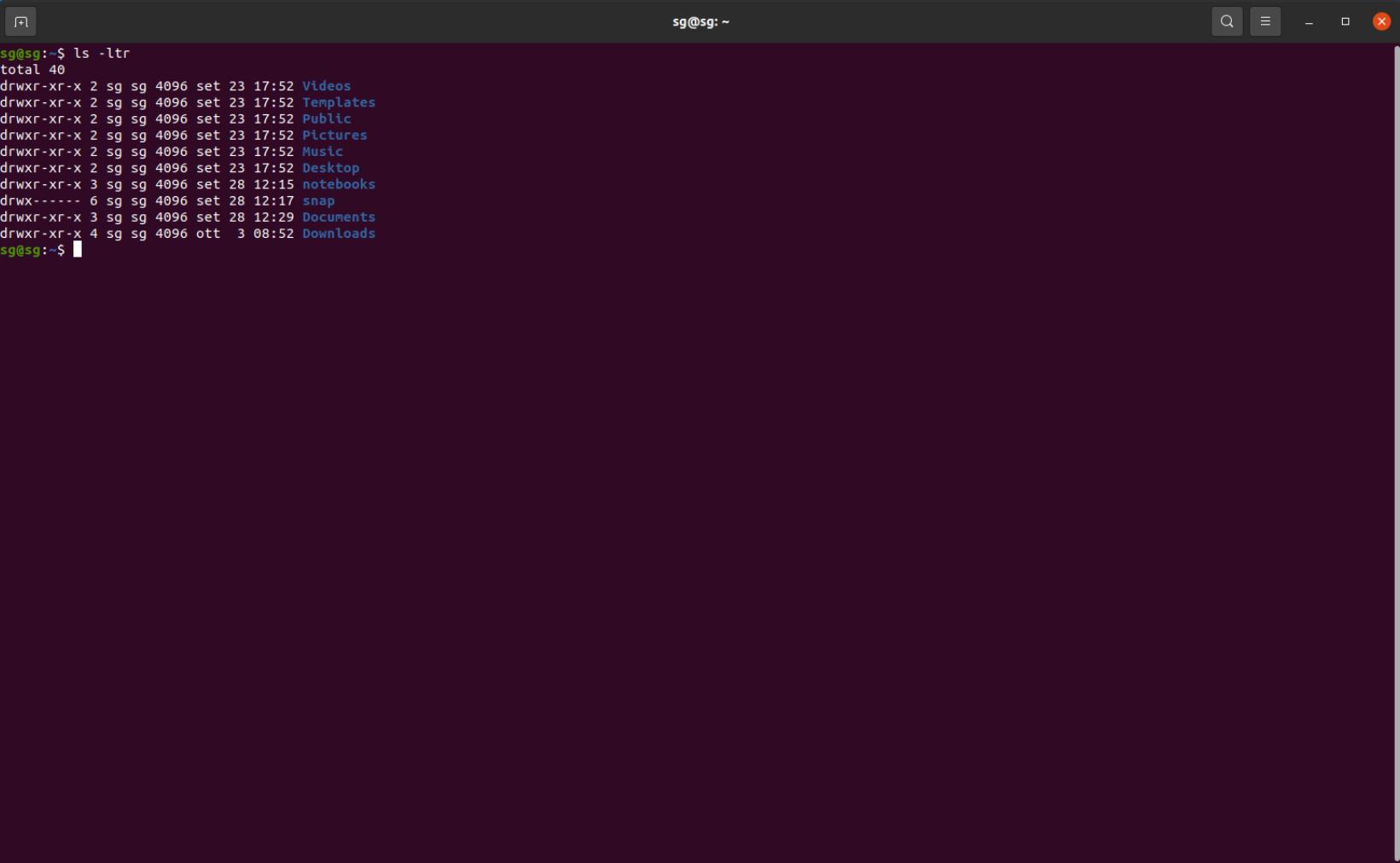
Linux



Linux



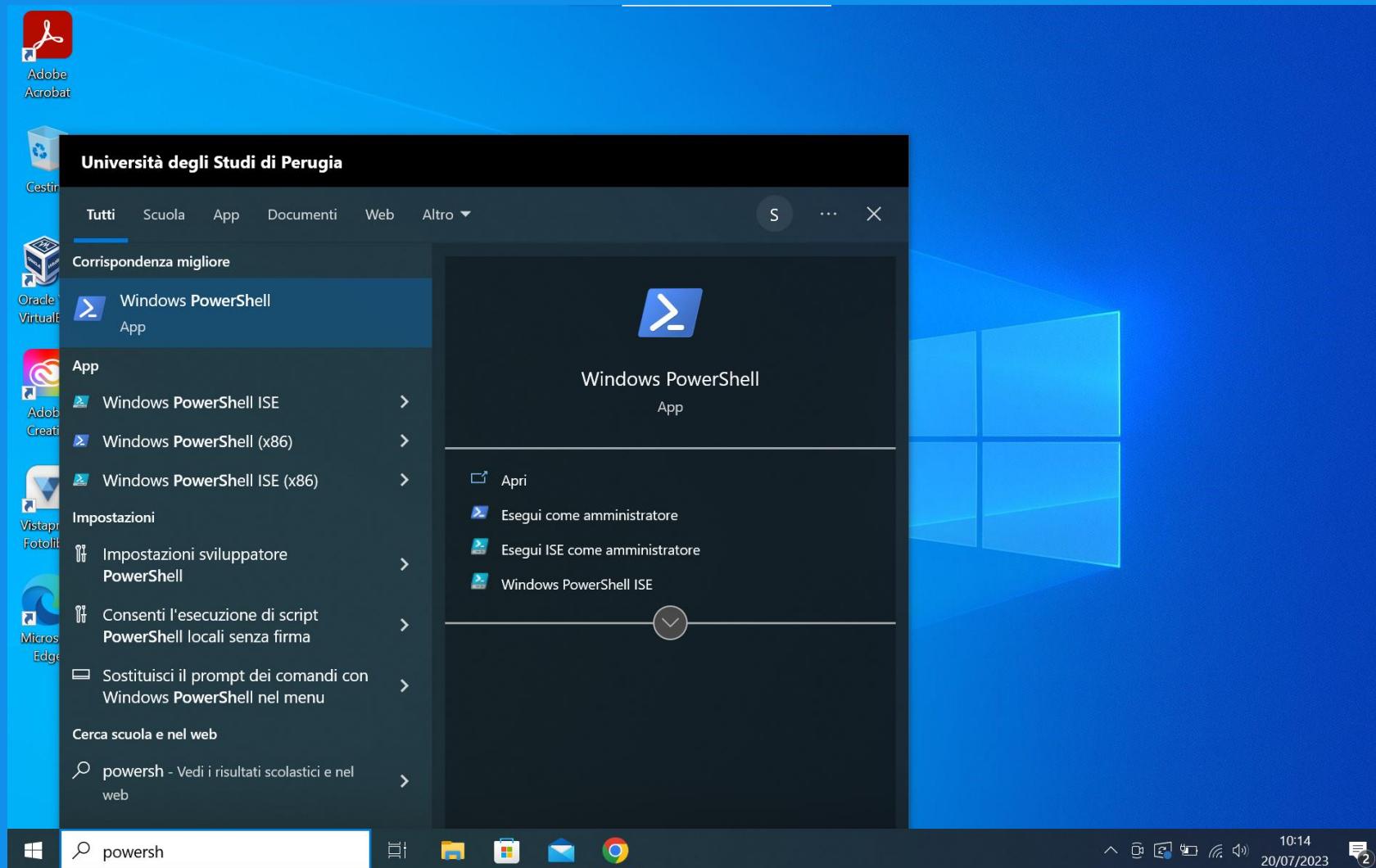
Terminale – Linux / Mac OS



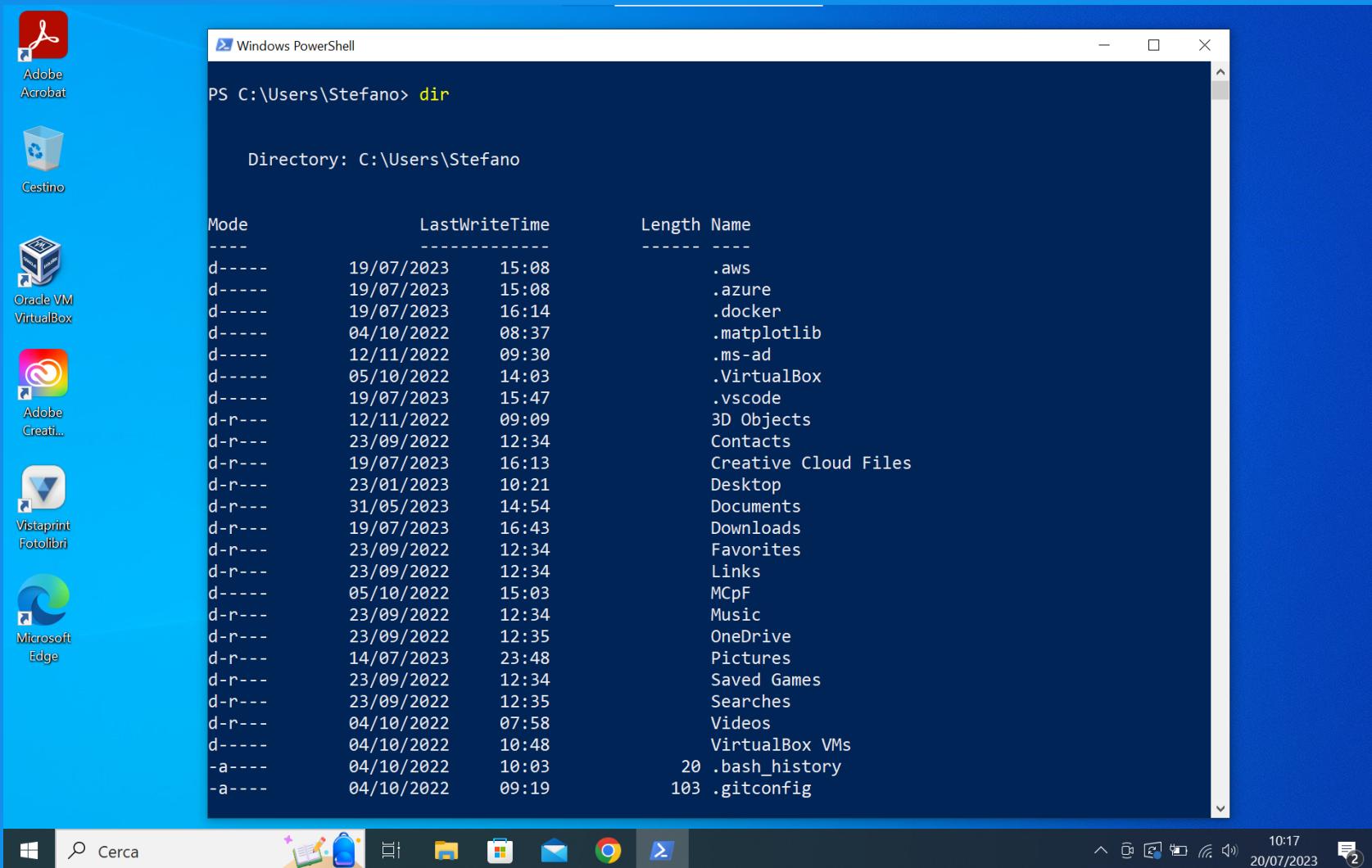
A screenshot of a terminal window titled "sg@sg: ~". The window shows the output of the command "ls -ltr", listing the contents of the user's home directory. The output includes files like Videos, Templates, Public, Pictures, Music, Desktop, notebooks, snap, Documents, and Downloads, along with system directories and files.

```
sg@sg:~$ ls -ltr
total 40
drwxr-xr-x 2 sg sg 4096 set 23 17:52 Videos
drwxr-xr-x 2 sg sg 4096 set 23 17:52 Templates
drwxr-xr-x 2 sg sg 4096 set 23 17:52 Public
drwxr-xr-x 2 sg sg 4096 set 23 17:52 Pictures
drwxr-xr-x 2 sg sg 4096 set 23 17:52 Music
drwxr-xr-x 2 sg sg 4096 set 23 17:52 Desktop
drwxr-xr-x 3 sg sg 4096 set 28 12:15 notebooks
drwx----- 6 sg sg 4096 set 28 12:17 snap
drwxr-xr-x 3 sg sg 4096 set 28 12:29 Documents
drwxr-xr-x 4 sg sg 4096 ott  3 08:52 Downloads
sg@sg:~$
```

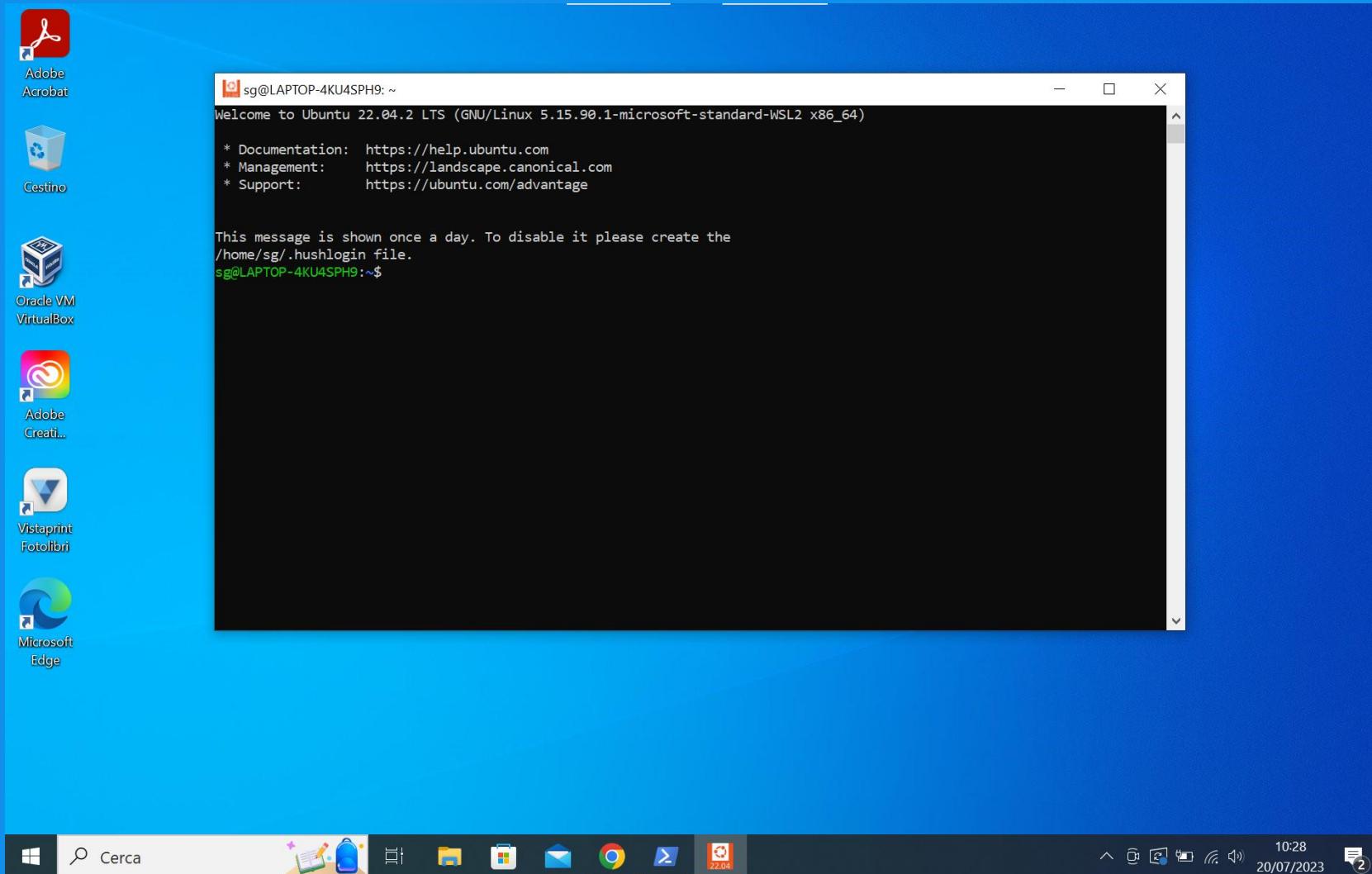
Windows Power Shell



Windows Power Shell



Windows Subsystem for Linux (WSL)

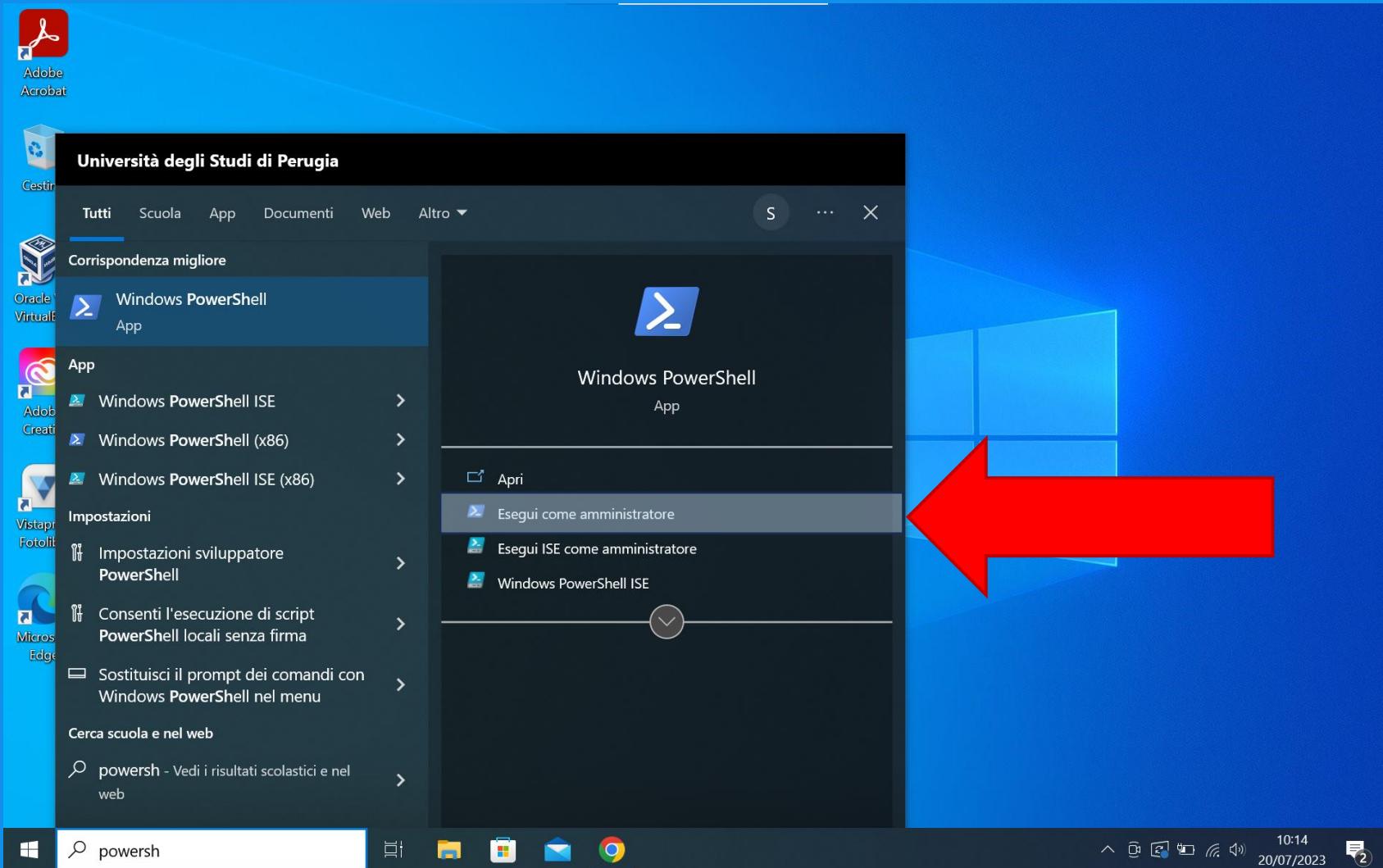


WSL

<https://learn.microsoft.com/it-it/windows/wsl/install>

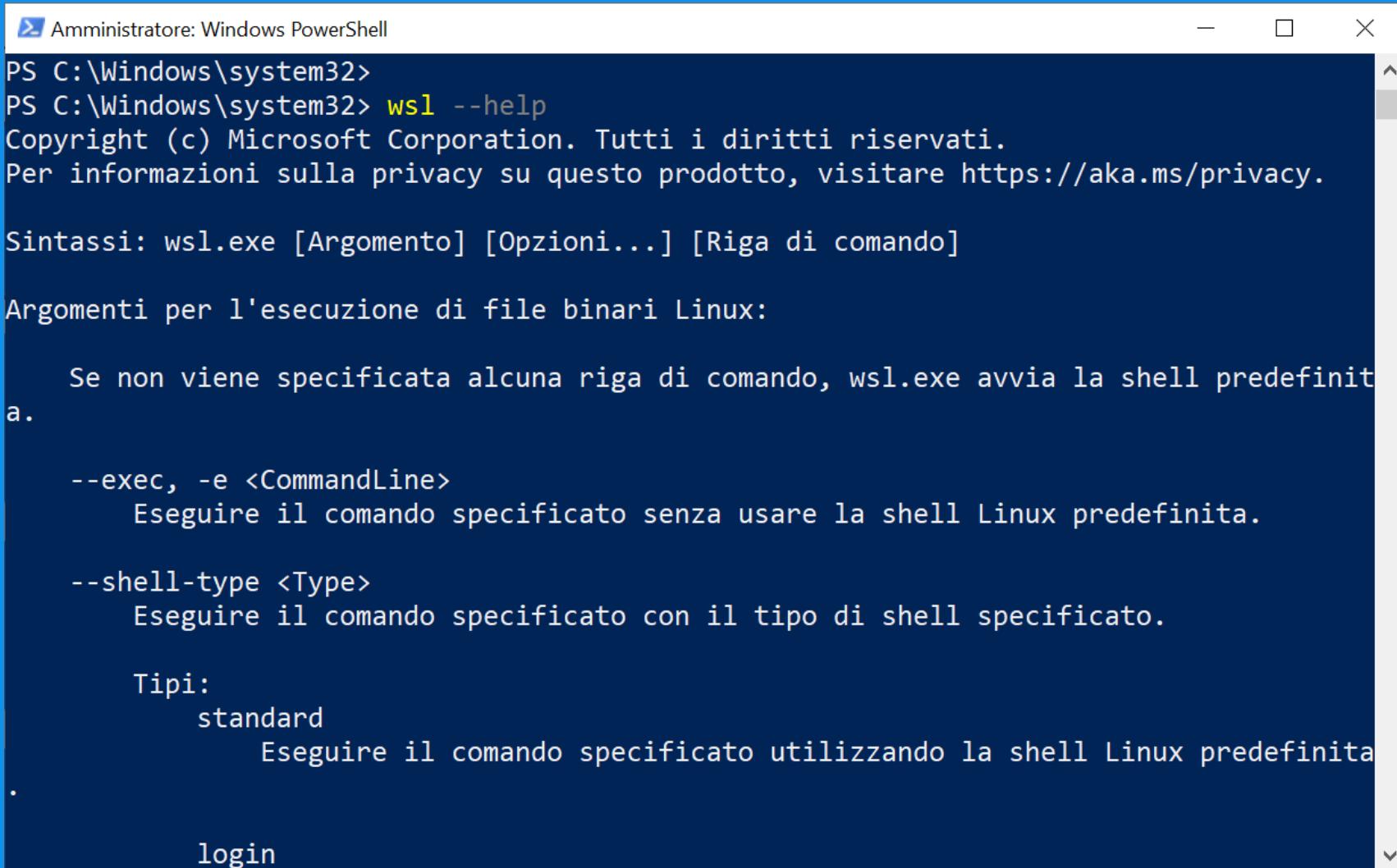
The screenshot shows a Microsoft Edge browser window displaying the Microsoft Learn article titled "Installare Linux in Windows con WSL". The URL in the address bar is <https://learn.microsoft.com/it-it/windows/wsl/install>. The page header includes the Microsoft logo, Learn, Documentazione, and other navigation links. The main content area features the title "Installare Linux in Windows con WSL" with a subtitle "Articolo • 07/07/2023 • 8 contributori". Below the title is a section titled "In questo articolo" with several links: "Prerequisiti", "Installare il comando WSL", "Modificare la distribuzione Linux predefinita installata", "Configurare le informazioni utente Linux", and "Mostra 6 in più". A summary paragraph at the bottom states: "Gli sviluppatori possono accedere alla potenza di Windows e Linux contemporaneamente in un computer Windows. La sottosistema Windows per Linux (WSL) consente agli sviluppatori di installare una distribuzione Linux (ad esempio Ubuntu, OpenSUSE, Kali, Debian, Arch Linux e così via) e usare". The right sidebar contains "Risorse aggiuntive" sections: "Documentazione" (link to "Configurare un ambiente di sviluppo WSL"), "Confronto tra versioni di WSL" (link to "WSL 2 offre i vantaggi di WSL 1, ma usa un kernel Linux effettivo, anziché un livello di conversione come WSL 1, con..."), and "Risoluzione dei problemi relativi a Sottosistema Windows per Linux" (link to "Fornisce informazioni dettagliate sugli errori e sui problemi comuni che si verificano durante l'esecuzione di Linux i..."). At the bottom right of the page is the number "9".

Windows Power Shell come Amministratore



Se richiesto concedere
il permesso di
apportare modifiche
al dispositivo

WSL



```
PS C:\Windows\system32>
PS C:\Windows\system32> wsl --help
Copyright (c) Microsoft Corporation. Tutti i diritti riservati.
Per informazioni sulla privacy su questo prodotto, visitare https://aka.ms/privacy.

Sintassi: wsl.exe [Argomento] [Opzioni...] [Riga di comando]

Argomenti per l'esecuzione di file binari Linux:

    Se non viene specificata alcuna riga di comando, wsl.exe avvia la shell predefinita.

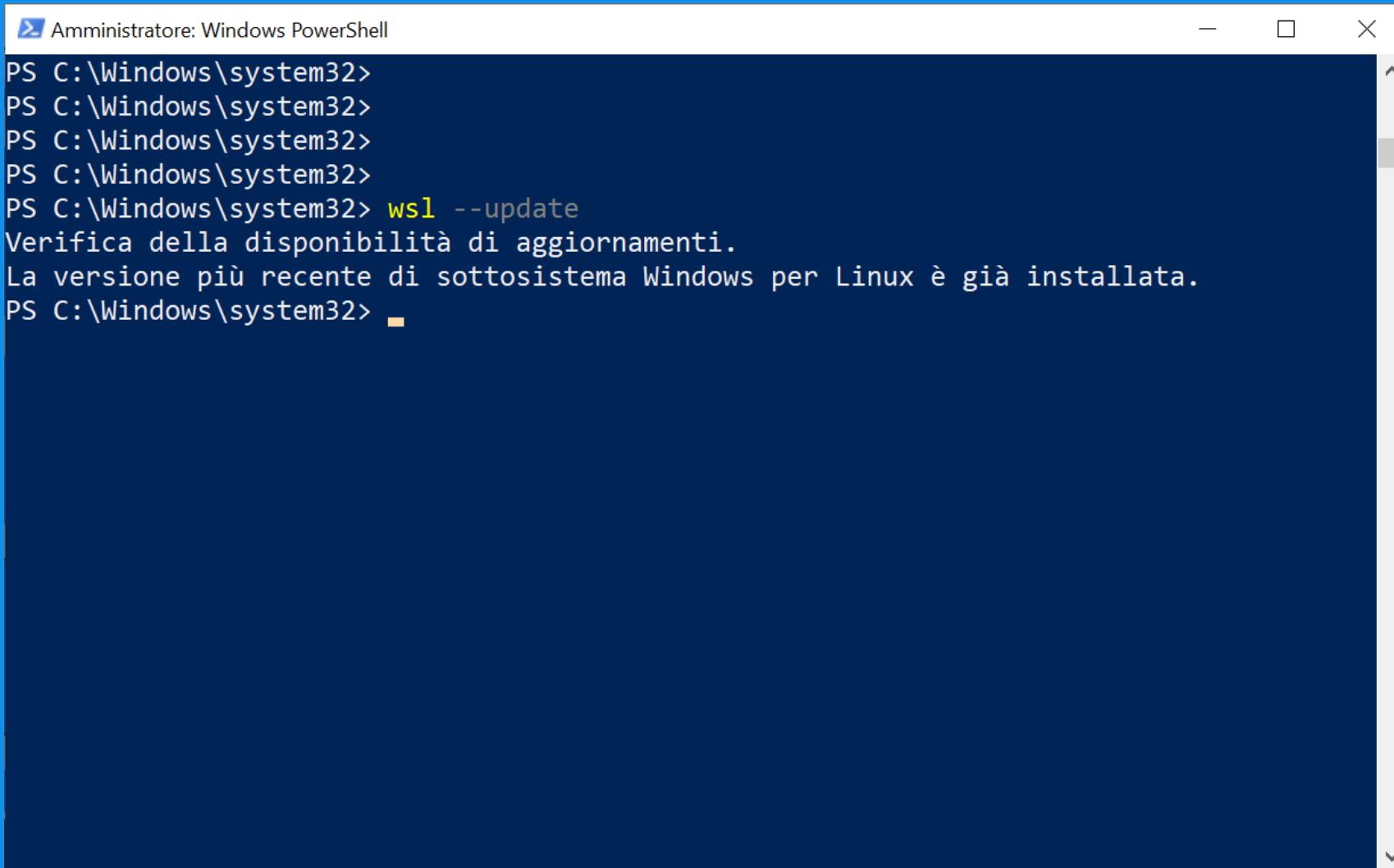
a.

    --exec, -e <CommandLine>
        Eseguire il comando specificato senza usare la shell Linux predefinita.

    --shell-type <Type>
        Eseguire il comando specificato con il tipo di shell specificato.

    Tipi:
        standard
            Eseguire il comando specificato utilizzando la shell Linux predefinita
.
.
.
    login
```

WSL

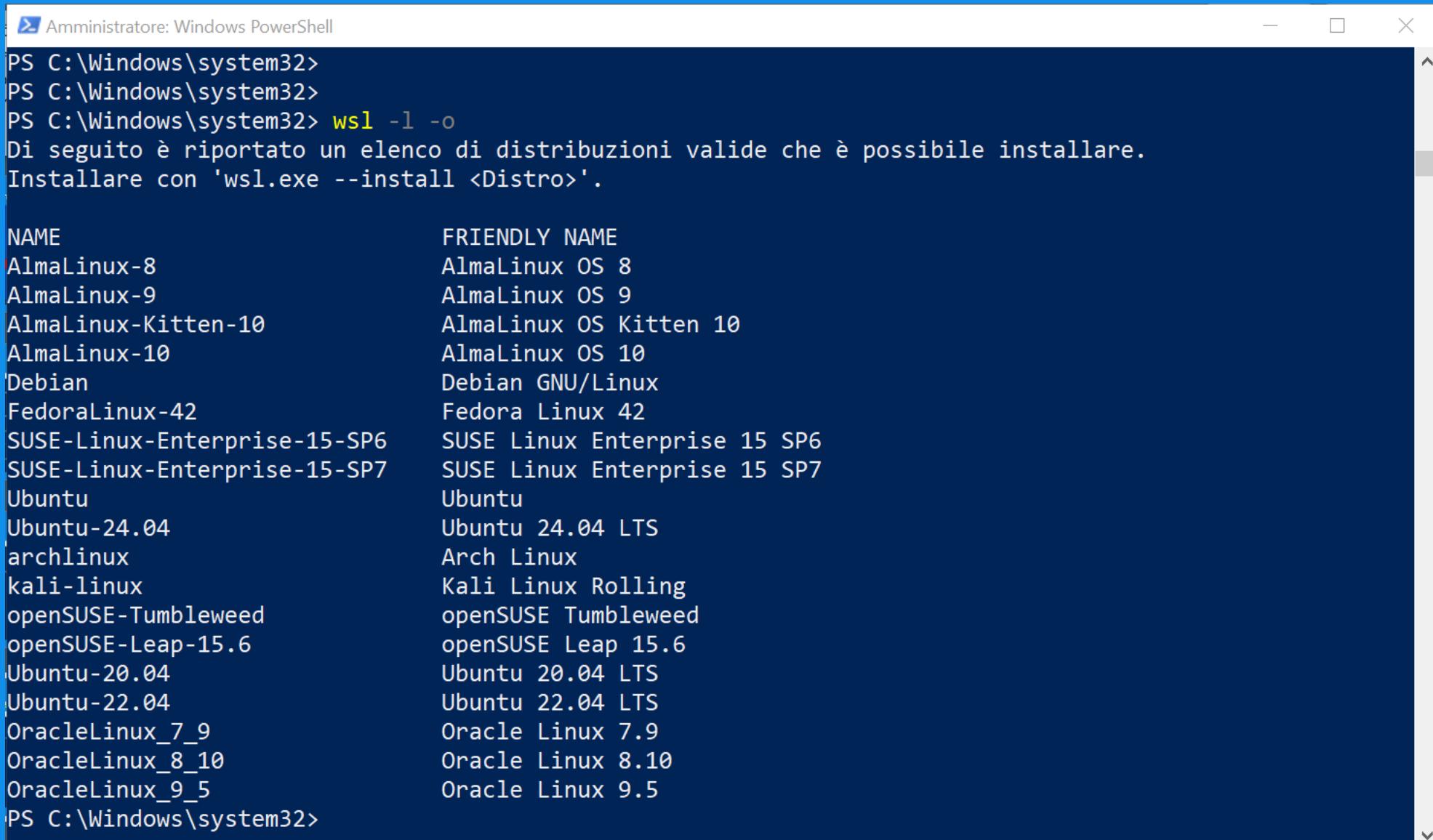


Amministratore: Windows PowerShell

```
PS C:\Windows\system32>
PS C:\Windows\system32>
PS C:\Windows\system32>
PS C:\Windows\system32>
PS C:\Windows\system32> wsl --update
Verifica della disponibilità di aggiornamenti.
La versione più recente di sottosistema Windows per Linux è già installata.
PS C:\Windows\system32>
```

WSL

Aprire PowerShell come Amministratore

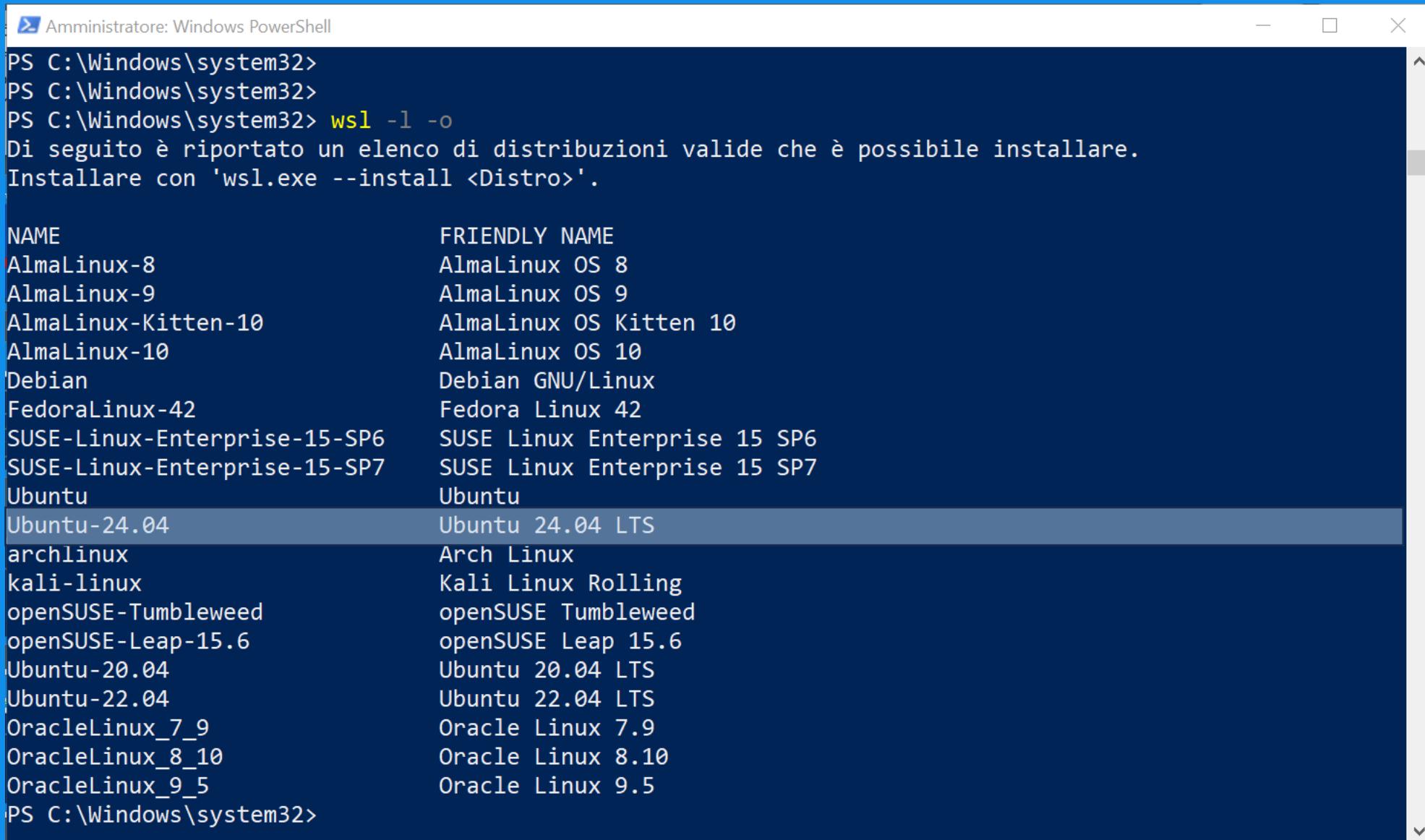


```
PS C:\Windows\system32>
PS C:\Windows\system32>
PS C:\Windows\system32> wsl -l -o
Di seguito è riportato un elenco di distribuzioni valide che è possibile installare.
Installare con 'wsl.exe --install <Distro>'.

NAME                      FRIENDLY NAME
AlmaLinux-8                AlmaLinux OS 8
AlmaLinux-9                AlmaLinux OS 9
AlmaLinux-Kitten-10        AlmaLinux OS Kitten 10
AlmaLinux-10               AlmaLinux OS 10
Debian                     Debian GNU/Linux
FedoraLinux-42              Fedora Linux 42
SUSE-Linux-Enterprise-15-SP6 SUSE Linux Enterprise 15 SP6
SUSE-Linux-Enterprise-15-SP7 SUSE Linux Enterprise 15 SP7
Ubuntu                      Ubuntu
Ubuntu-24.04                Ubuntu 24.04 LTS
archlinux                   Arch Linux
kali-linux                  Kali Linux Rolling
openSUSE-Tumbleweed         openSUSE Tumbleweed
openSUSE-Leap-15.6           openSUSE Leap 15.6
Ubuntu-20.04                 Ubuntu 20.04 LTS
Ubuntu-22.04                 Ubuntu 22.04 LTS
OracleLinux_7_9              Oracle Linux 7.9
OracleLinux_8_10              Oracle Linux 8.10
OracleLinux_9_5              Oracle Linux 9.5
PS C:\Windows\system32>
```

WSL

Aprire PowerShell come Amministratore



```
PS C:\Windows\system32>
PS C:\Windows\system32>
PS C:\Windows\system32> wsl -l -o
Di seguito è riportato un elenco di distribuzioni valide che è possibile installare.
Installare con 'wsl.exe --install <Distro>'.

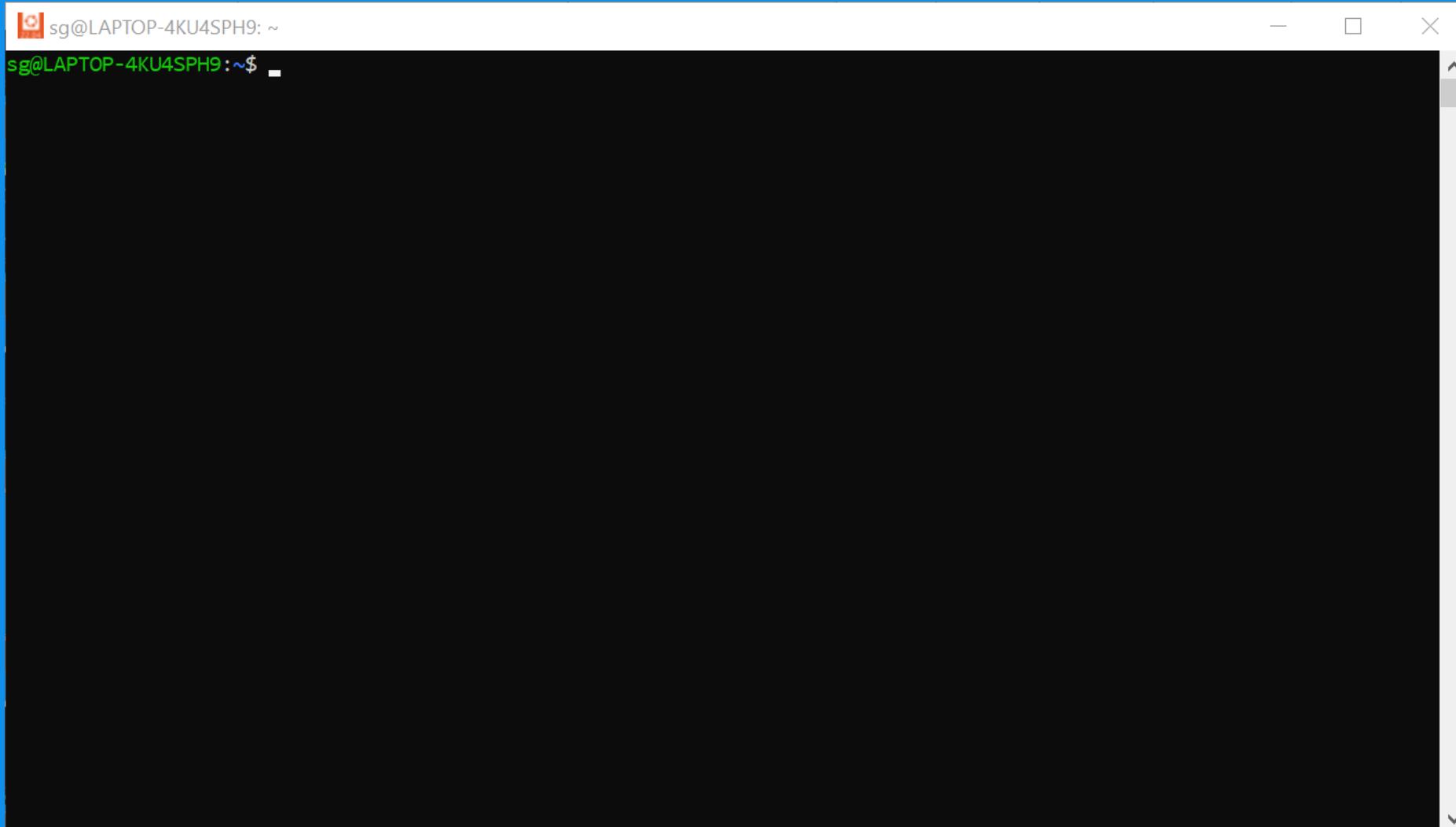
NAME                      FRIENDLY NAME
AlmaLinux-8                AlmaLinux OS 8
AlmaLinux-9                AlmaLinux OS 9
AlmaLinux-Kitten-10        AlmaLinux OS Kitten 10
AlmaLinux-10               AlmaLinux OS 10
Debian                     Debian GNU/Linux
FedoraLinux-42              Fedora Linux 42
SUSE-Linux-Enterprise-15-SP6 SUSE Linux Enterprise 15 SP6
SUSE-Linux-Enterprise-15-SP7 SUSE Linux Enterprise 15 SP7
Ubuntu                      Ubuntu
Ubuntu-24.04                Ubuntu 24.04 LTS
archlinux                   Arch Linux
kali-linux                  Kali Linux Rolling
openSUSE-Tumbleweed         openSUSE Tumbleweed
openSUSE-Leap-15.6           openSUSE Leap 15.6
Ubuntu-20.04                 Ubuntu 20.04 LTS
Ubuntu-22.04                 Ubuntu 22.04 LTS
OracleLinux_7_9              Oracle Linux 7.9
OracleLinux_8_10              Oracle Linux 8.10
OracleLinux_9_5              Oracle Linux 9.5
PS C:\Windows\system32>
```

WSL

```
PS C:\Windows\system32>
PS C:\Windows\system32> wsl -l -o
Di seguito è riportato un elenco di distribuzioni valide che è possibile installare.
Installare con 'wsl.exe --install <Distro>'.

NAME                      FRIENDLY NAME
AlmaLinux-8                AlmaLinux OS 8
AlmaLinux-9                AlmaLinux OS 9
AlmaLinux-Kitten-10        AlmaLinux OS Kitten 10
AlmaLinux-10               AlmaLinux OS 10
Debian                     Debian GNU/Linux
FedoraLinux-42              Fedora Linux 42
SUSE-Linux-Enterprise-15-SP6 SUSE Linux Enterprise 15 SP6
SUSE-Linux-Enterprise-15-SP7 SUSE Linux Enterprise 15 SP7
Ubuntu                      Ubuntu
Ubuntu-24.04                Ubuntu 24.04 LTS
archlinux                   Arch Linux
kali-linux                  Kali Linux Rolling
openSUSE-Tumbleweed          openSUSE Tumbleweed
openSUSE-Leap-15.6            openSUSE Leap 15.6
Ubuntu-20.04                 Ubuntu 20.04 LTS
Ubuntu-22.04                 Ubuntu 22.04 LTS
OracleLinux_7_9              Oracle Linux 7.9
OracleLinux_8_10              Oracle Linux 8.10
OracleLinux_9_5              Oracle Linux 9.5
PS C:\Windows\system32>
PS C:\Windows\system32> wsl --install -d Ubuntu-24.04
```

Terminale Linux WLS

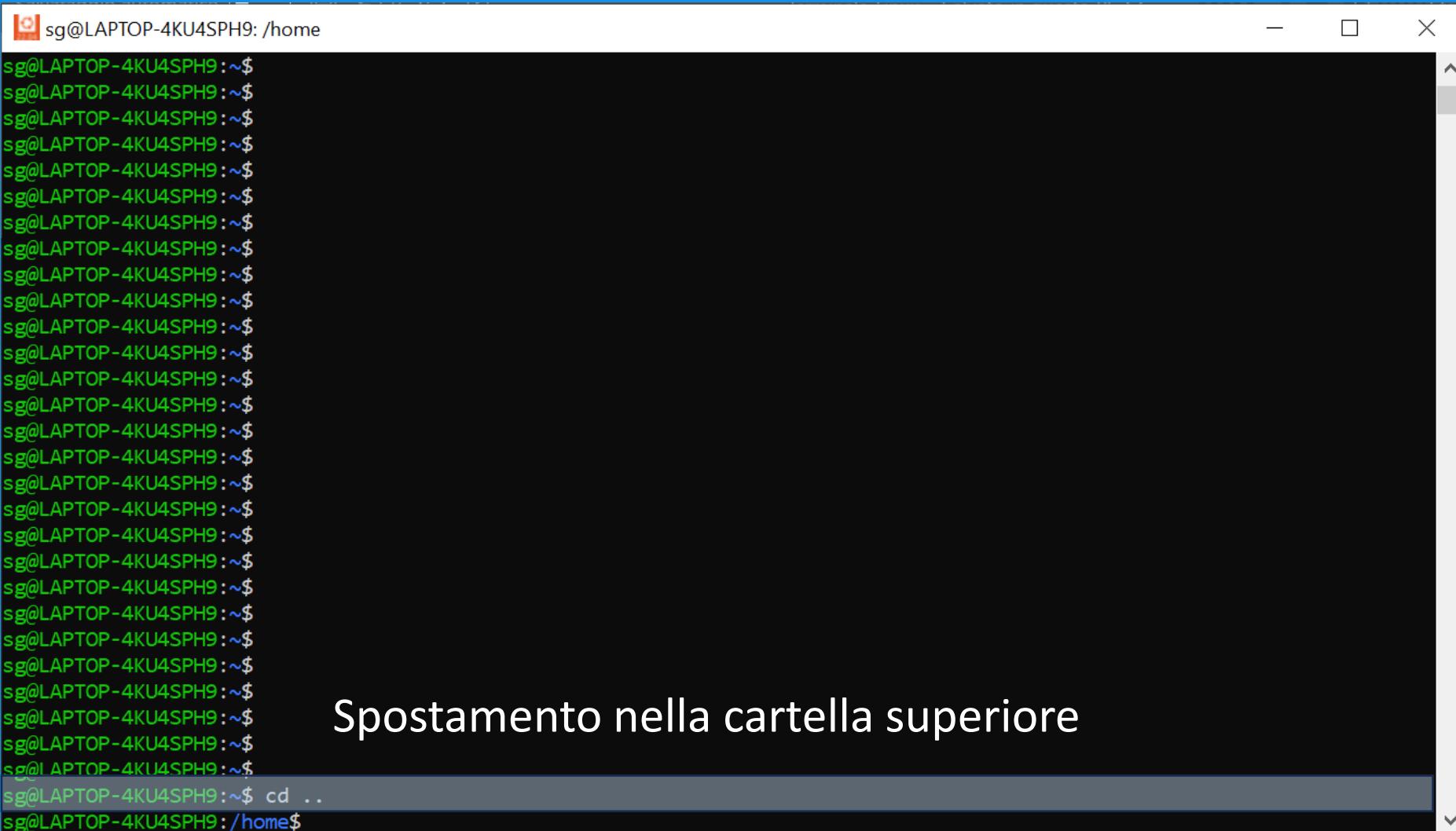
A screenshot of a Windows terminal window titled "sg@LAPTOP-4KU4SPH9: ~". The window is mostly blank, showing a large black area. The title bar is white with black text. There are standard window controls (minimize, maximize, close) in the top right corner. A vertical scroll bar is visible on the right side of the window.

```
sg@LAPTOP-4KU4SPH9: ~$
```

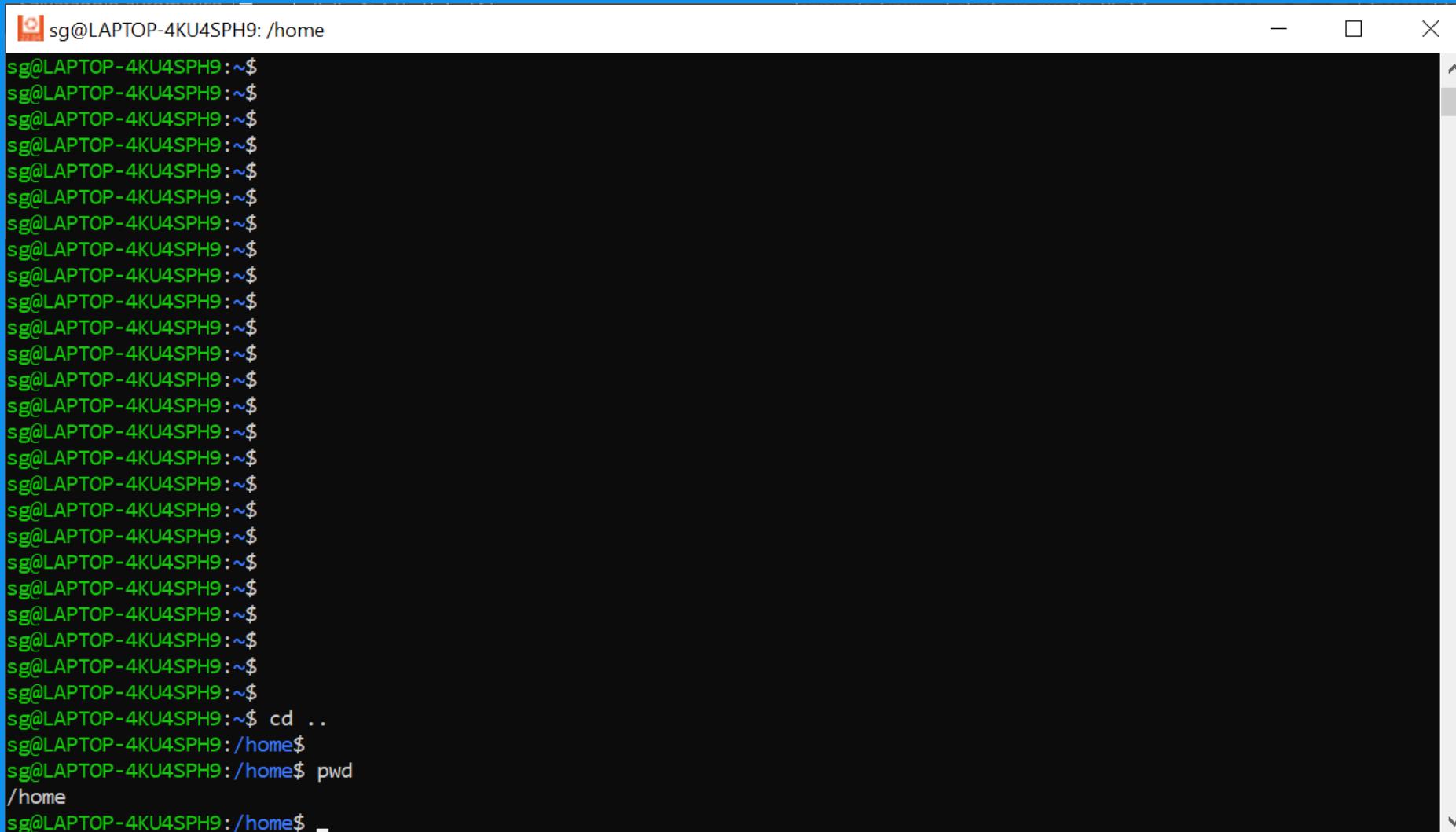
Comandi Base Terminale Linux - pwd

Posizione attuale nell'albero delle cartelle

Comandi Base Terminale Linux – cd ..



The screenshot shows a terminal window with a black background and white text. At the top, it displays the user's name and host: `sg@LAPTOP-4KU4SPH9: /home`. Below this, there are approximately 20 blank lines of text, each consisting of the user's name and host followed by a prompt symbol (`:~$`). In the bottom right corner of the terminal window, the text `Spostamento nella cartella superiore` is overlaid in white. At the very bottom of the terminal window, the command `sg@LAPTOP-4KU4SPH9:~$ cd ..` is visible, with the cursor positioned at the end of the command line.

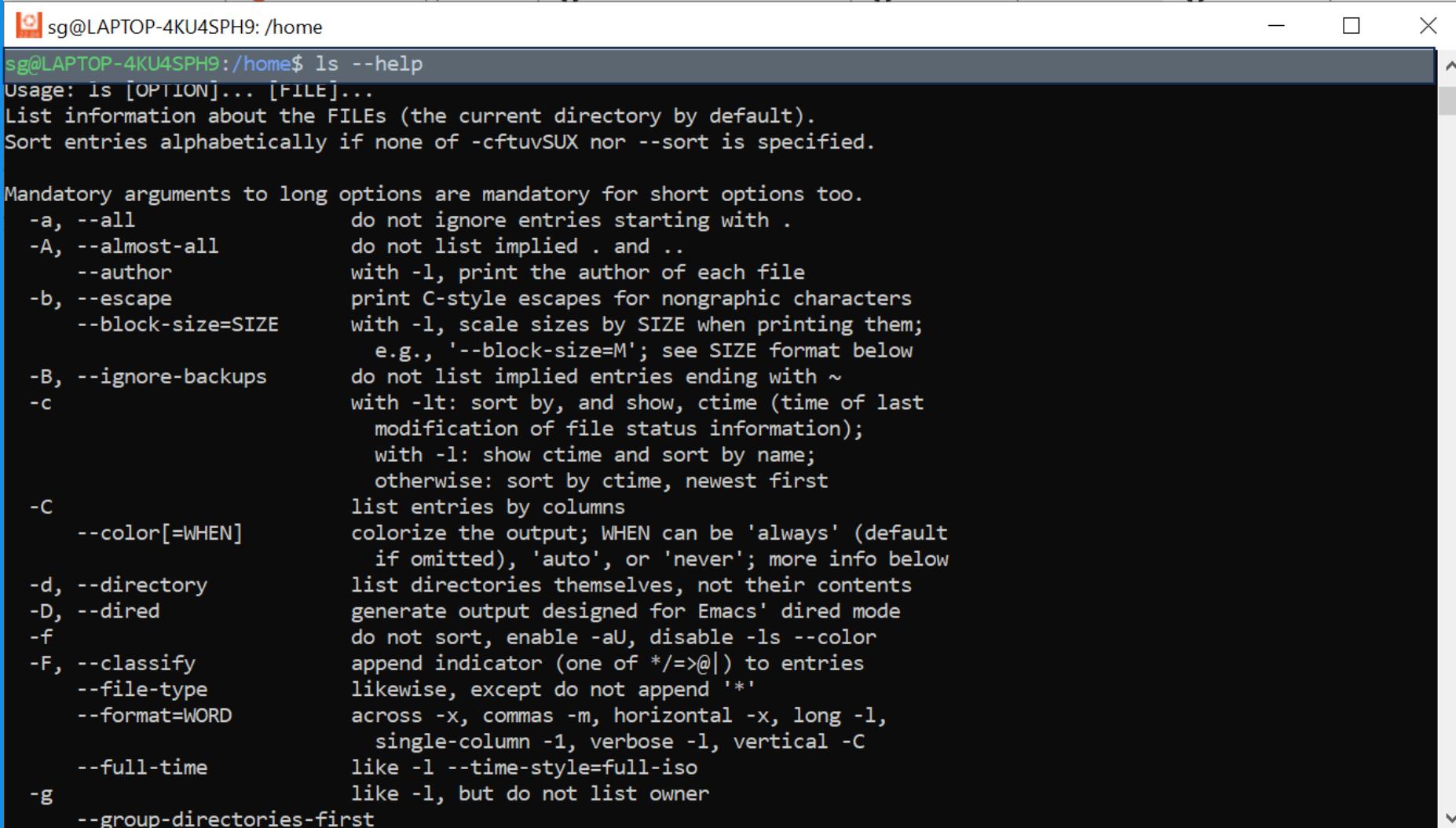


Comandi Base Terminale Linux – ls

```
sg@LAPTOP-4KU4SPH9: /home
sg@LAPTOP-4KU4SPH9 :~$ 
sg@LAPTOP-4KU4SPH9 :~$ cd .. 
sg@LAPTOP-4KU4SPH9 :/home$ 
sg@LAPTOP-4KU4SPH9 :/home$ pwd 
/home
sg@LAPTOP-4KU4SPH9 :/home$ ls 
sg
sg@LAPTOP-4KU4SPH9 :/home$ ls -l 
total 4 
drwxr-x--- 6 sg sg 4096 Jul 20 14:08 sg
sg@LAPTOP-4KU4SPH9 :/home$ 
sg@LAPTOP-4KU4SPH9 :/home$ 
sg@LAPTOP-4KU4SPH9 :/home$ 
sg@LAPTOP-4KU4SPH9 :/home$ 
sg@LAPTOP-4KU4SPH9 :/home$
```

Elenco contenuto della cartella

... Help



```
sg@LAPTOP-4KU4SPH9: /home
sg@LAPTOP-4KU4SPH9:/home$ ls --help
Usage: ls [OPTION]... [FILE]...
List information about the FILEs (the current directory by default).
Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.

Mandatory arguments to long options are mandatory for short options too.
-a, --all                      do not ignore entries starting with .
-A, --almost-all                do not list implied . and ..
--author                         with -l, print the author of each file
-b, --escape                      print C-style escapes for nongraphic characters
--block-size=SIZE                 with -l, scale sizes by SIZE when printing them;
                                  e.g., '--block-size=M'; see SIZE format below
-B, --ignore-backups              do not list implied entries ending with ~
-c                               with -lt: sort by, and show, ctime (time of last
                                  modification of file status information);
                                  with -l: show ctime and sort by name;
                                  otherwise: sort by ctime, newest first
-C                               list entries by columns
--color[=WHEN]                   colorize the output; WHEN can be 'always' (default
                                  if omitted), 'auto', or 'never'; more info below
-d, --directory                  list directories themselves, not their contents
-D, --dired                       generate output designed for Emacs' dired mode
-f
-F, --classify                    append indicator (one of */=>@|) to entries
--file-type                      likewise, except do not append '*'
--format=WORD                     across -x, commas -m, horizontal -x, long -l,
                                  single-column -1, verbose -l, vertical -C
--full-time                       like -l --time-style=full-iso
-g                               like -l, but do not list owner
--group-directories-first
```

Comandi Base Terminale Linux - cd *dir*

Spostamento in una cartella specifica

Comandi Base Terminale Linux – cd -

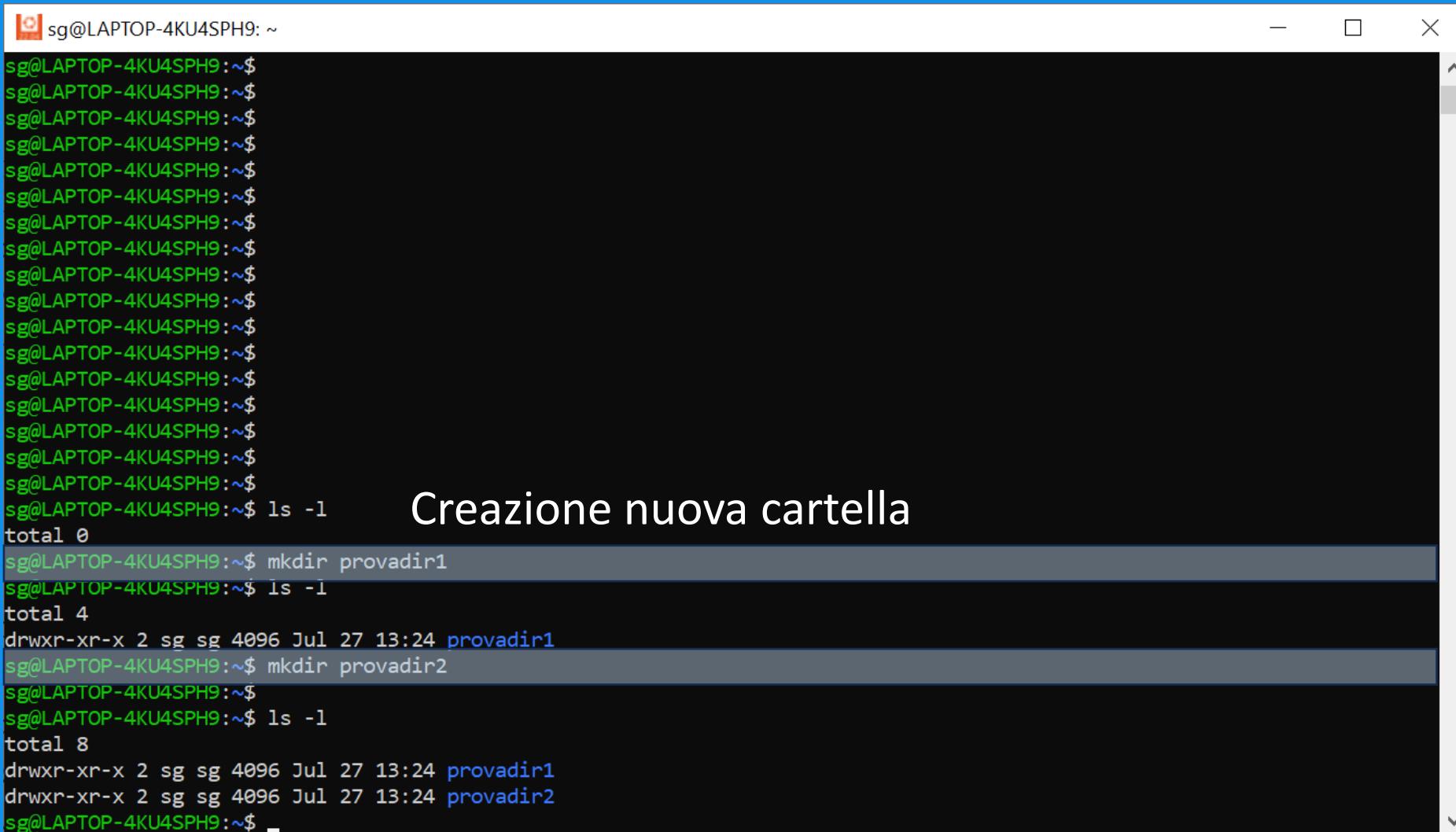


The screenshot shows a terminal window with a black background and white text. It displays a session of a user named sg on a laptop with the IP 4KU4SPH9. The session starts with several blank lines, followed by the command `cd ..`, which moves the user up one directory level from their home directory. The current directory is then shown as `/home`. The user then runs `pwd` to print the current working directory, which also shows `/home`. Next, the user runs `ls -l` to list the contents of the directory, showing a single file named `sg` with permissions `drwxr-x---`, owner `sg`, group `sg`, size `4096`, modified on `Jul 26 18:38`, and name `sg`. The user then changes into the `sg` directory with `cd sg`. After this, the user runs `pwd` again, which now shows the full path `/home/sg`. Finally, the user runs `cd -`, which returns them to their original directory, `/home`.

Spostamento nella cartella precedente

```
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ cd ..  
sg@LAPTOP-4KU4SPH9:/home$  
sg@LAPTOP-4KU4SPH9:/home$ pwd  
/home  
sg@LAPTOP-4KU4SPH9:/home$ ls -l  
total 4  
drwxr-x--- 7 sg sg 4096 Jul 26 18:38 sg  
sg@LAPTOP-4KU4SPH9:/home$  
sg@LAPTOP-4KU4SPH9:/home$  
sg@LAPTOP-4KU4SPH9:/home$  
sg@LAPTOP-4KU4SPH9:/home$ cd sg/  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ pwd  
/home/sg  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ cd -  
/home  
sg@LAPTOP-4KU4SPH9:/home$ pwd  
/home  
sg@LAPTOP-4KU4SPH9:/home$ cd -  
/home/sg  
sg@LAPTOP-4KU4SPH9:~$ pwd  
/home/sg  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ -
```

Comandi Base Terminale Linux – mkdir



The screenshot shows a terminal window with a black background and white text. At the top left, there is a small icon of a laptop with a red border. The window title bar contains the text "sg@LAPTOP-4KU4SPH9: ~". On the right side of the window, there are standard window control buttons for minimizing, maximizing, and closing the window.

The terminal session starts with several blank lines of text, each ending with a green dollar sign (\$). Then, the command "ls -l" is run, followed by "total 0", indicating no files or subdirectories are present. Next, the "mkdir" command is used twice: "mkdir provadir1" and "mkdir provadir2". After each "mkdir" command, the "ls -l" command is run again. The output shows the creation of two new directories: "provadir1" and "provadir2", both with permissions "drwxr-xr-x" and ownership "sg sg". Finally, another "ls -l" command is run, showing a total of 8 items (the two directories plus their previous contents).

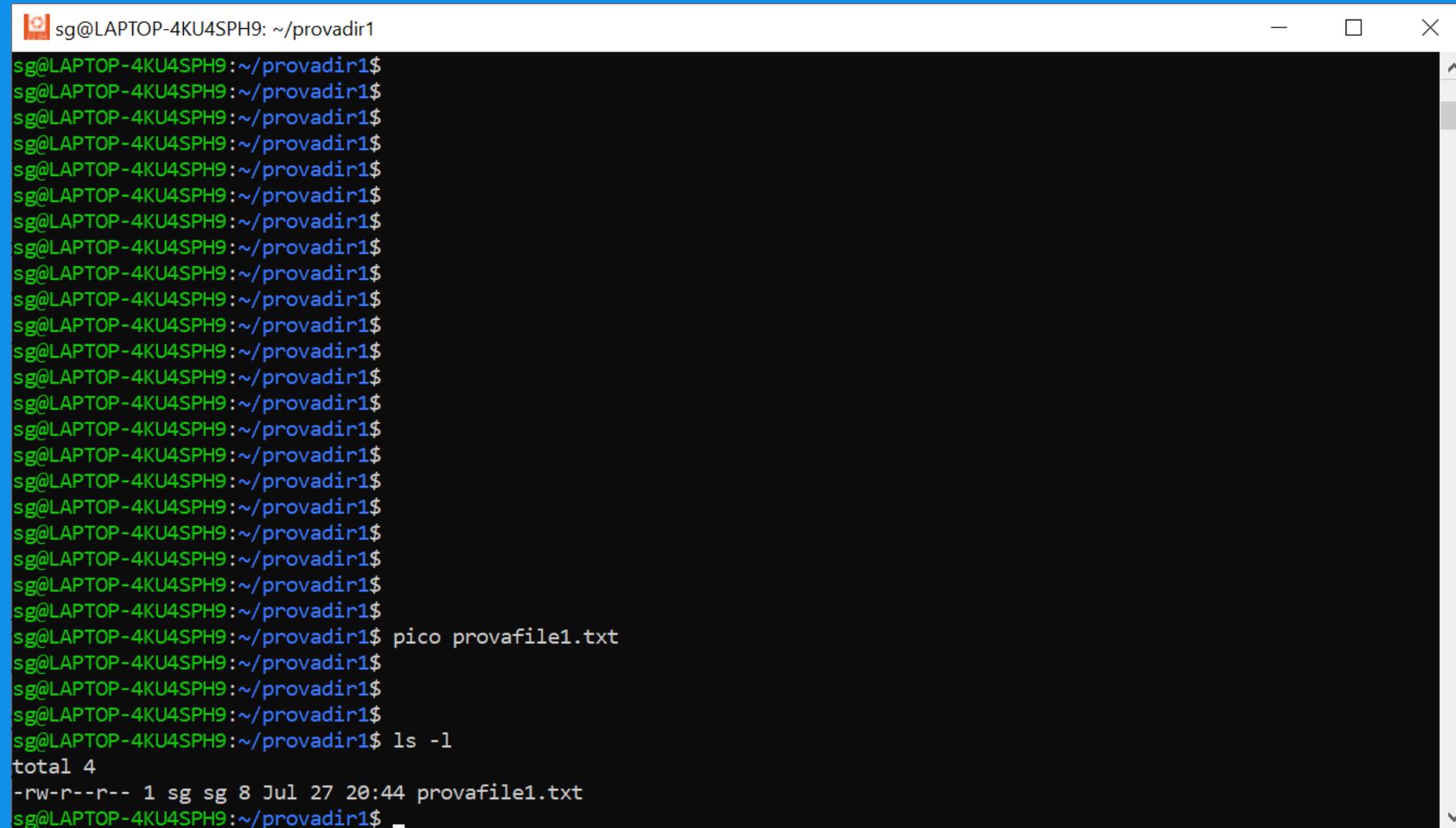
```
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ ls -l      Creazione nuova cartella  
total 0  
sg@LAPTOP-4KU4SPH9:~$ mkdir provadir1  
sg@LAPTOP-4KU4SPH9:~$ ls -l  
total 4  
drwxr-xr-x 2 sg sg 4096 Jul 27 13:24 provadir1  
sg@LAPTOP-4KU4SPH9:~$ mkdir provadir2  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ ls -l  
total 8  
drwxr-xr-x 2 sg sg 4096 Jul 27 13:24 provadir1  
drwxr-xr-x 2 sg sg 4096 Jul 27 13:24 provadir2  
sg@LAPTOP-4KU4SPH9:~$
```

Comandi Base Terminale Linux – pico

Creazione o modifica file di testo – editor pico

Comandi Base Terminale Linux – pico



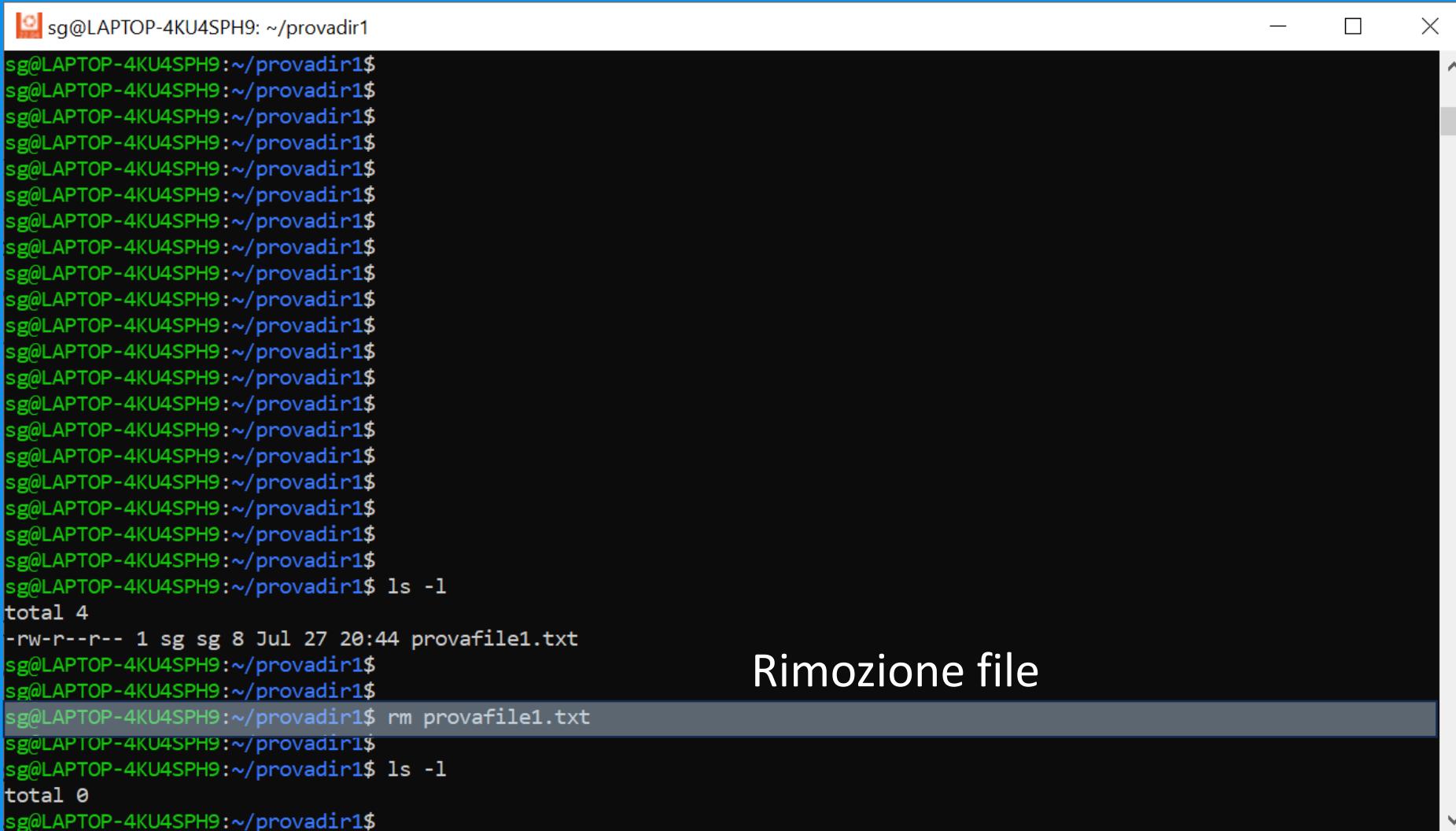


```
sg@LAPTOP-4KU4SPH9: ~/provadir1$  
sg@LAPTOP-4KU4SPH9: ~/provadir1$ pico provafile1.txt  
sg@LAPTOP-4KU4SPH9: ~/provadir1$  
sg@LAPTOP-4KU4SPH9: ~/provadir1$  
sg@LAPTOP-4KU4SPH9: ~/provadir1$  
sg@LAPTOP-4KU4SPH9: ~/provadir1$  
sg@LAPTOP-4KU4SPH9: ~/provadir1$ ls -l  
total 4  
-rw-r--r-- 1 sg sg 8 Jul 27 20:44 provafile1.txt  
sg@LAPTOP-4KU4SPH9: ~/provadir1$
```

Comandi Base Terminale Linux - more

Visualizzazione contenuto file di testo

Comandi Base Terminale Linux - rm



The screenshot shows a terminal window with a black background and white text. The window title bar indicates the session is running on a laptop with the identifier 4KU4SPH9, in a directory named provadir1. The terminal prompt is sg@LAPTOP-4KU4SPH9:~/provadir1\$.

The terminal history shows multiple identical prompts, followed by the command:

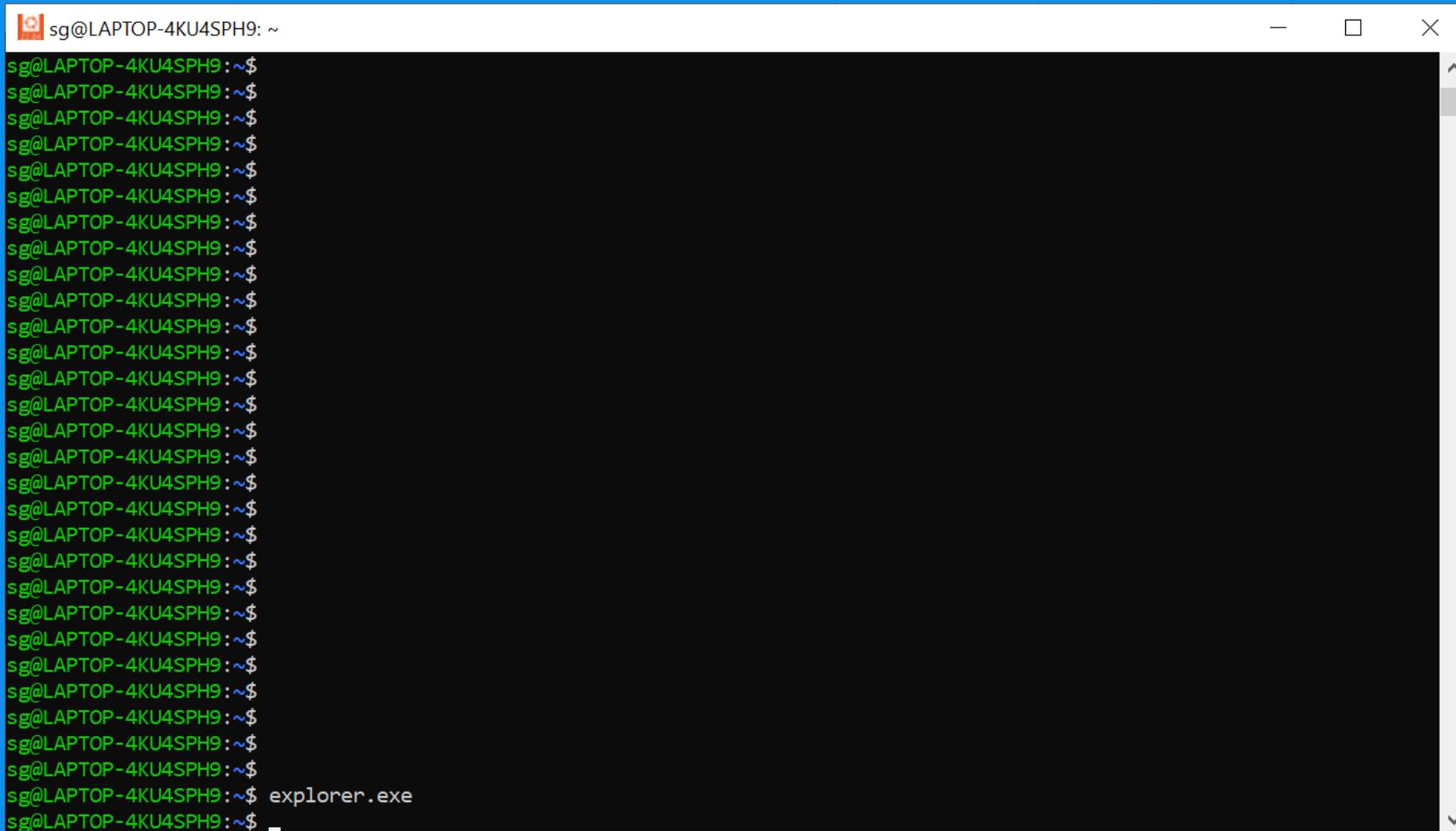
```
sg@LAPTOP-4KU4SPH9:~/provadir1$ ls -l
total 4
-rw-r--r-- 1 sg sg 8 Jul 27 20:44 provafайл1.txt
sg@LAPTOP-4KU4SPH9:~/provadir1$ rm provafайл1.txt
sg@LAPTOP-4KU4SPH9:~/provadir1$ ls -l
total 0
sg@LAPTOP-4KU4SPH9:~/provadir1$
```

A large gray rectangular box highlights the command `rm provafайл1.txt`. To the right of this highlighted area, the word "Rimozione file" is written in a large, bold, black font.

Comandi Base Terminale Linux - rm

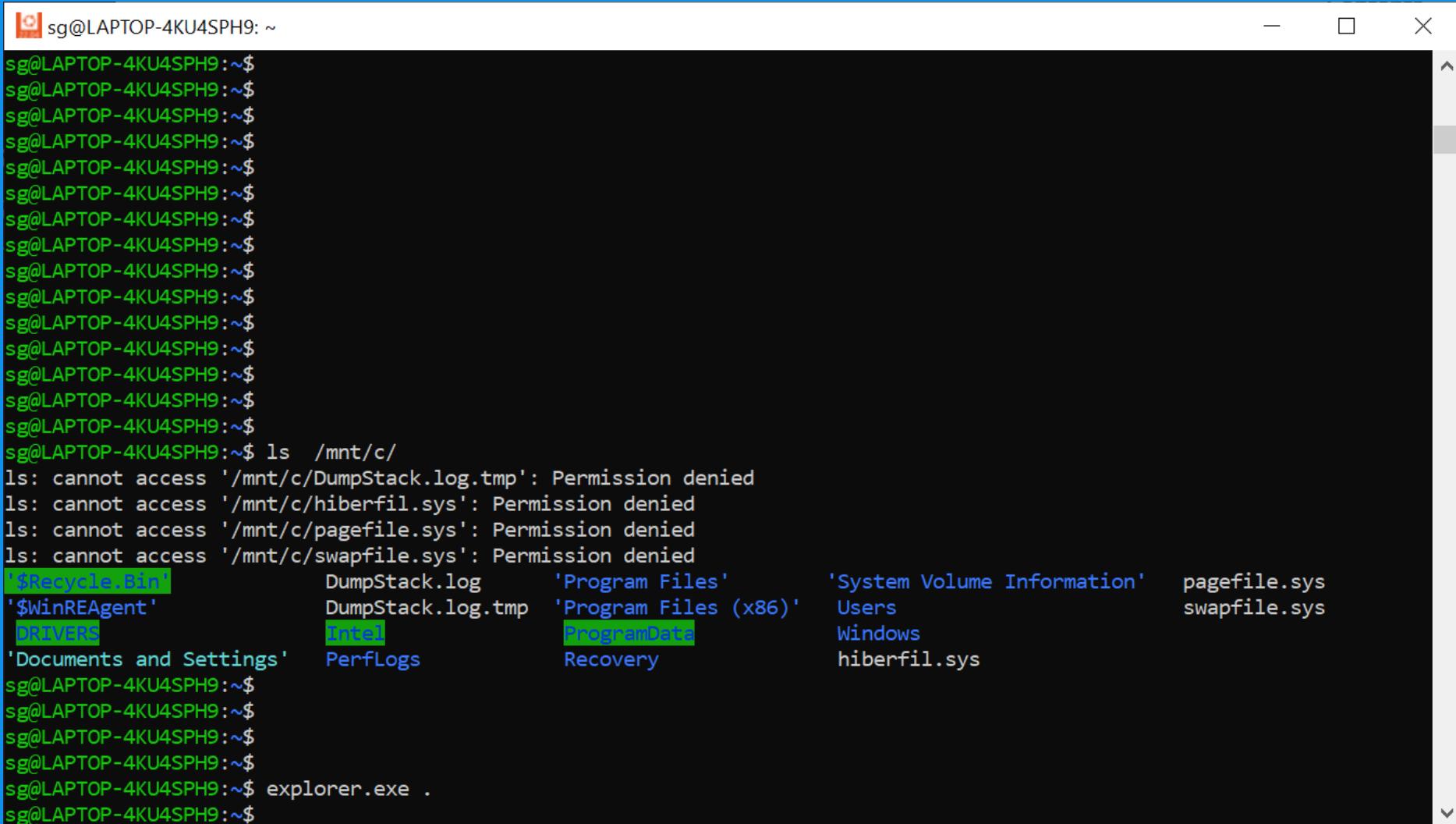
Rimozione cartella

Accesso Incrociato WSL-Windows



A screenshot of a Windows terminal window titled "sg@LAPTOP-4KU4SPH9: ~". The window contains a single line of text: "sg@LAPTOP-4KU4SPH9:~\$ explorer.exe". The terminal has a dark background with white text. The title bar is blue with white text. There are standard window controls (minimize, maximize, close) in the top right corner.

Accesso Incrociato WSL-Windows



The screenshot shows a terminal window with a black background and white text. The title bar indicates the session is running on a Linux distribution (Ubuntu) within WSL, with the host being a Windows laptop. The user is sg and the session ID is LAPTOP-4KU4SPH9.

```
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ ls /mnt/c/  
ls: cannot access '/mnt/c/DumpStack.log.tmp': Permission denied  
ls: cannot access '/mnt/c/hiberfil.sys': Permission denied  
ls: cannot access '/mnt/c/pagefile.sys': Permission denied  
ls: cannot access '/mnt/c/swapfile.sys': Permission denied  
'${Recycle.Bin}'          DumpStack.log      'Program Files'        'System Volume Information'    pagefile.sys  
'$WinREAgent'            DumpStack.log.tmp   'Program Files (x86)'    Users                      swapfile.sys  
'DRIVERS'                Intel                 ProgramData  
'Documents and Settings' PerfLogs           Recovery  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ explorer.exe .  
sg@LAPTOP-4KU4SPH9:~$
```

```
● ● ●

[!] sg@LAPTOP-4KU4SPH9: ~
sg@LAPTOP-4KU4SPH9:~$ 
sg@LAPTOP-4KU4SPH9:~$ ls /mnt/c/
ls: cannot access '/mnt/c/DumpStack.log.tmp': Permission denied
ls: cannot access '/mnt/c/hiberfil.sys': Permission denied
ls: cannot access '/mnt/c/pagefile.sys': Permission denied
ls: cannot access '/mnt/c/swapfile.sys': Permission denied
'$Recycle.Bin'          DumpStack.log      'Program Files'        'System Volume Information'    pagefile.sys
'$WinREAgent'           DumpStack.log.tmp   'Program Files (x86)'   Users                      swapfile.sys
'DRIVERS'                Intel             ProgramData          Windows
'Documents and Settings' PerfLogs          Recovery            hiberfil.sys
sg@LAPTOP-4KU4SPH9:~$ 
sg@LAPTOP-4KU4SPH9:~$ 
sg@LAPTOP-4KU4SPH9:~$ 
sg@LAPTOP-4KU4SPH9:~$ ls /mnt/c/Users/
'All Users'  Default  'Default User'  Public  Stefano  desktop.ini
sg@LAPTOP-4KU4SPH9:~$ 
sg@LAPTOP-4KU4SPH9:~$ 
sg@LAPTOP-4KU4SPH9:~$ 
sg@LAPTOP-4KU4SPH9:~$ 
sg@LAPTOP-4KU4SPH9:~$
```

WSL – Visual Studio Code (da Windows)

Ubuntu 24.04

```
#echo "nameserver 8.8.8.8" | sudo tee /etc/resolv.conf > /dev/null (NON necessario)
```

```
sudo apt update
```

```
sudo apt install emacs
```

```
sudo apt install python3-dev python3-tk python3-pyqt5  
sudo apt install python3-pip
```

```
sudo apt install python3-numpy python3-scipy python3-matplotlib python3-pandas  
python3-sympy
```

```
python3 -m pip install --break-system-packages argparse
```

Mac OS

```
python3 --version
```

Se la versione di python è > 3.4

```
    python -m ensurepip / python3 -m ensurepip
```

Altrimenti (assumendo la versione di pthon sia comunque 3.)*

```
curl https://bootstrap.pypa.io/get-pip.py -o get-pip.py
```

```
    python3 get-pip.py
```

In alternativa bisogna usare il manager di pacchetti Homebrew (<https://brew.sh/>):

```
    brew install python
```

```
python3 –m pip install numpy scipy matplotlib pandas sympy
```

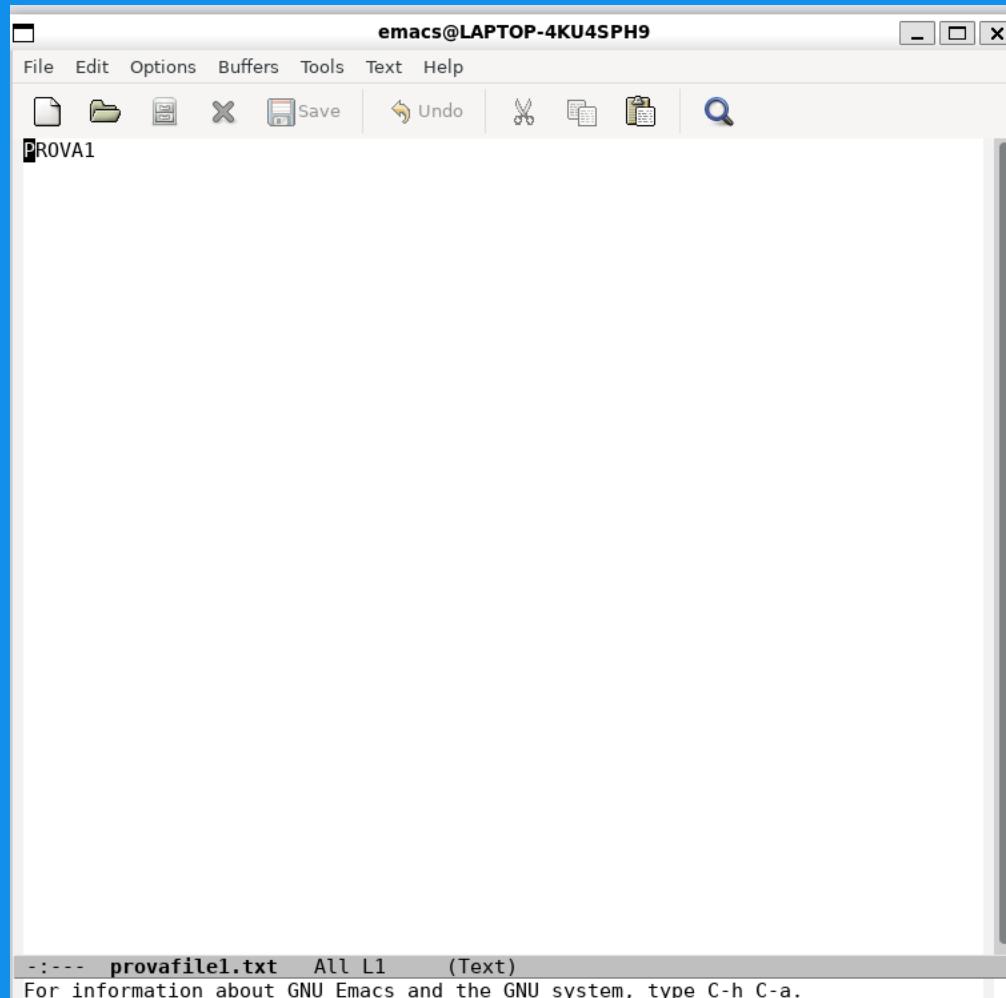
```
python3 -m pip install --break-system-packages argparse
```

Comandi Base Terminale Linux – emacs

```
sg@LAPTOP-4KU4SPH9:~/provadir1$  
sg@LAPTOP-4KU4SPH9:~/provadir1$ pico provofile1.txt  
sg@LAPTOP-4KU4SPH9:~/provadir1$  
sg@LAPTOP-4KU4SPH9:~/provadir1$  
sg@LAPTOP-4KU4SPH9:~/provadir1$  
sg@LAPTOP-4KU4SPH9:~/provadir1$  
sg@LAPTOP-4KU4SPH9:~/provadir1$ ls -l  
total 4  
-rw-r--r-- 1 sg sg 8 Jul 27 20:44 provofile1.txt  
sg@LAPTOP-4KU4SPH9:~/provadir1$  
sg@LAPTOP-4KU4SPH9:~/provadir1$  
sg@LAPTOP-4KU4SPH9:~/provadir1$ emacs provofile1.txt &
```

Creazione o modifica file di testo – editor emacs

Comandi Base Terminale Linux – emacs



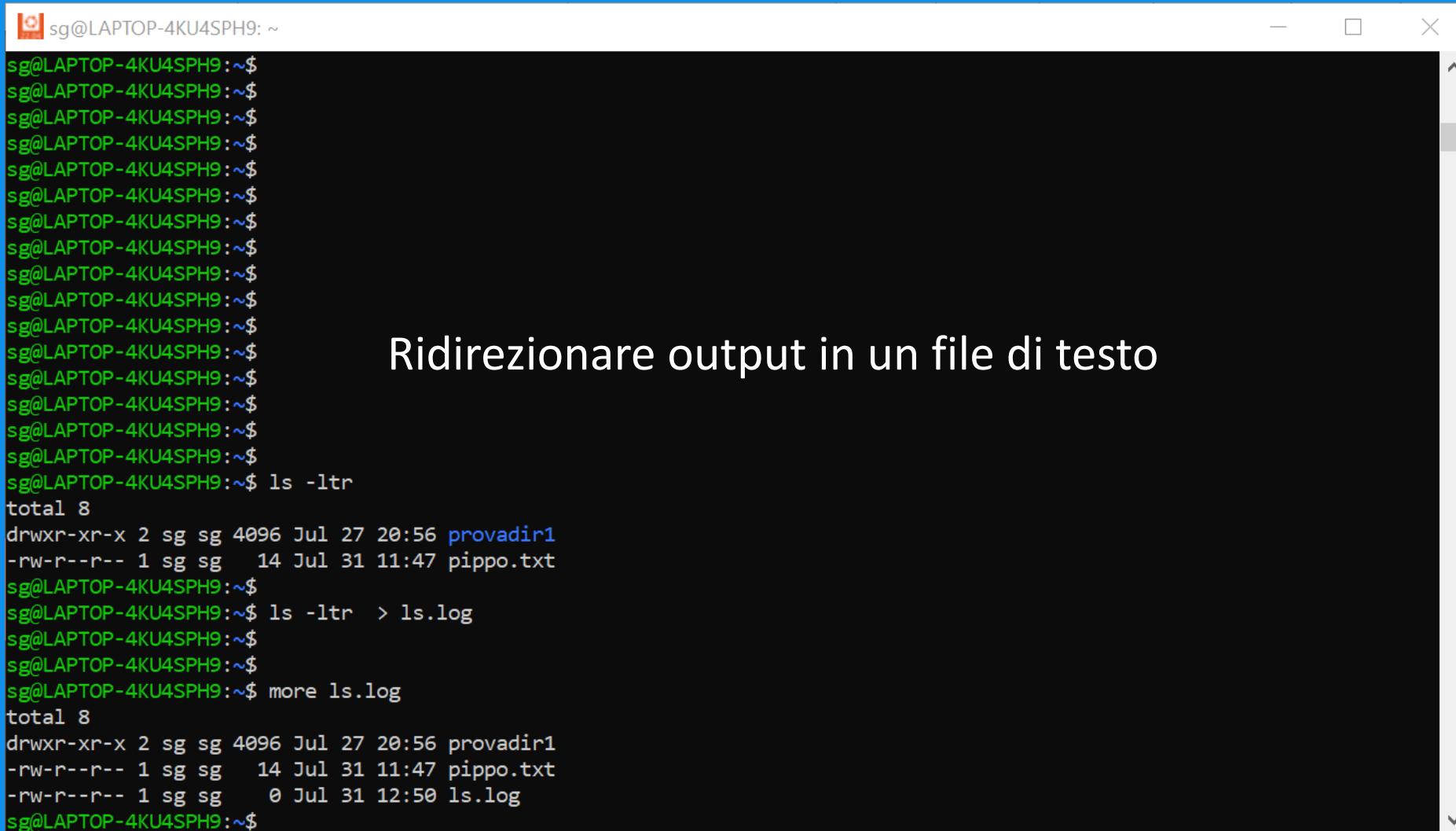
Editare

Per salvare: Ctrl x Ctrl s

Per uscire: Ctrl x Ctrl c

+ molti altri comandi

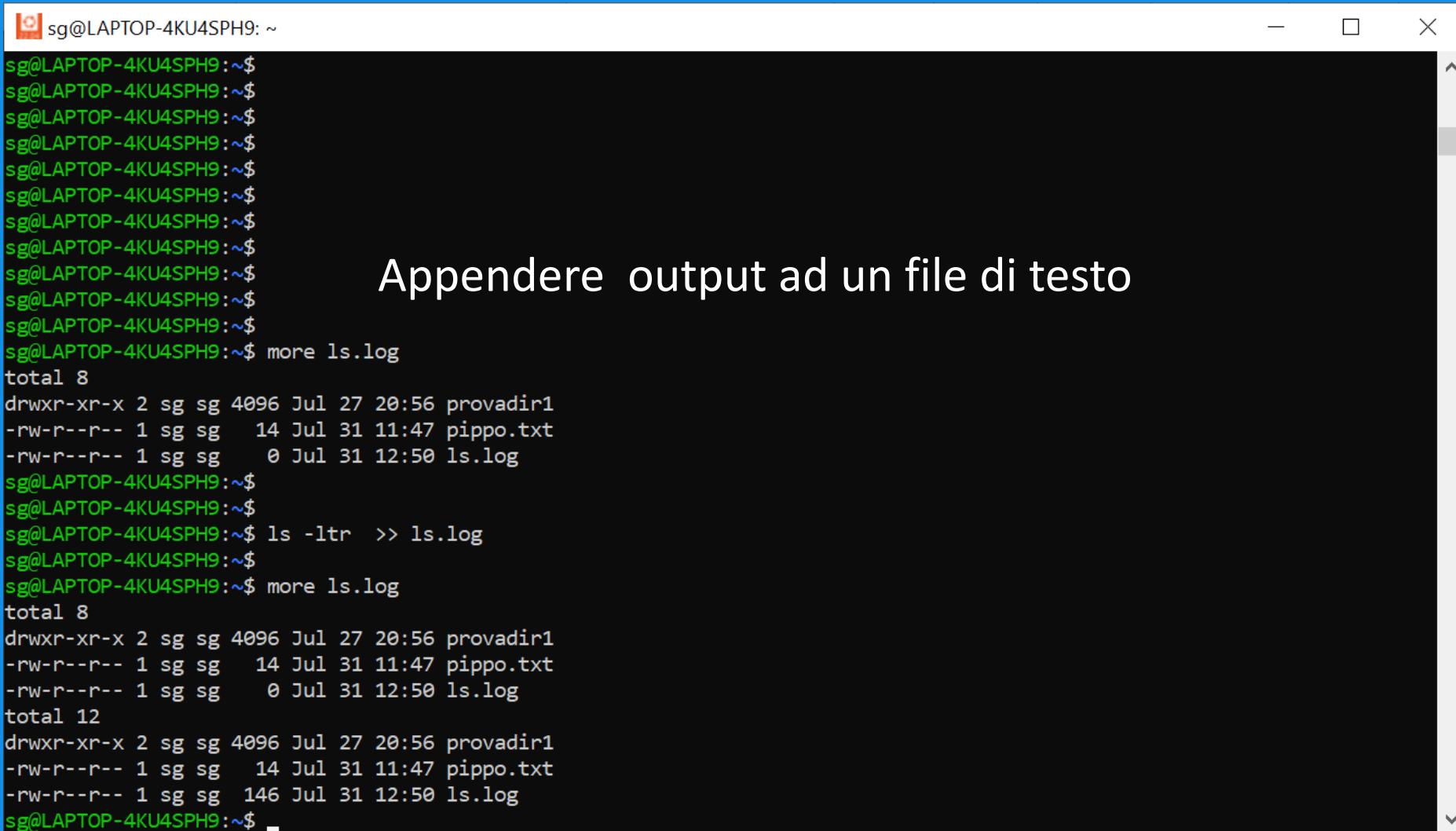
Comandi Base Terminale Linux – >, >>



```
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ ls -ltr  
total 8  
drwxr-xr-x 2 sg sg 4096 Jul 27 20:56 provadir1  
-rw-r--r-- 1 sg sg 14 Jul 31 11:47 pippo.txt  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ ls -ltr > ls.log  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ more ls.log  
total 8  
drwxr-xr-x 2 sg sg 4096 Jul 27 20:56 provadir1  
-rw-r--r-- 1 sg sg 14 Jul 31 11:47 pippo.txt  
-rw-r--r-- 1 sg sg 0 Jul 31 12:50 ls.log  
sg@LAPTOP-4KU4SPH9:~$
```

Ridirezionare output in un file di testo

Comandi Base Terminale Linux – >, >>



The screenshot shows a terminal window with a black background and white text. At the top left is a red icon with a white person symbol. The window title bar says "sg@LAPTOP-4KU4SPH9: ~\$". The window has standard minimize, maximize, and close buttons at the top right.

The terminal content is as follows:

```
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ more ls.log  
total 8  
drwxr-xr-x 2 sg sg 4096 Jul 27 20:56 provadir1  
-rw-r--r-- 1 sg sg 14 Jul 31 11:47 pippo.txt  
-rw-r--r-- 1 sg sg 0 Jul 31 12:50 ls.log  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ ls -ltr >> ls.log  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ more ls.log  
total 8  
drwxr-xr-x 2 sg sg 4096 Jul 27 20:56 provadir1  
-rw-r--r-- 1 sg sg 14 Jul 31 11:47 pippo.txt  
-rw-r--r-- 1 sg sg 0 Jul 31 12:50 ls.log  
total 12  
drwxr-xr-x 2 sg sg 4096 Jul 27 20:56 provadir1  
-rw-r--r-- 1 sg sg 14 Jul 31 11:47 pippo.txt  
-rw-r--r-- 1 sg sg 146 Jul 31 12:50 ls.log  
sg@LAPTOP-4KU4SPH9:~$
```

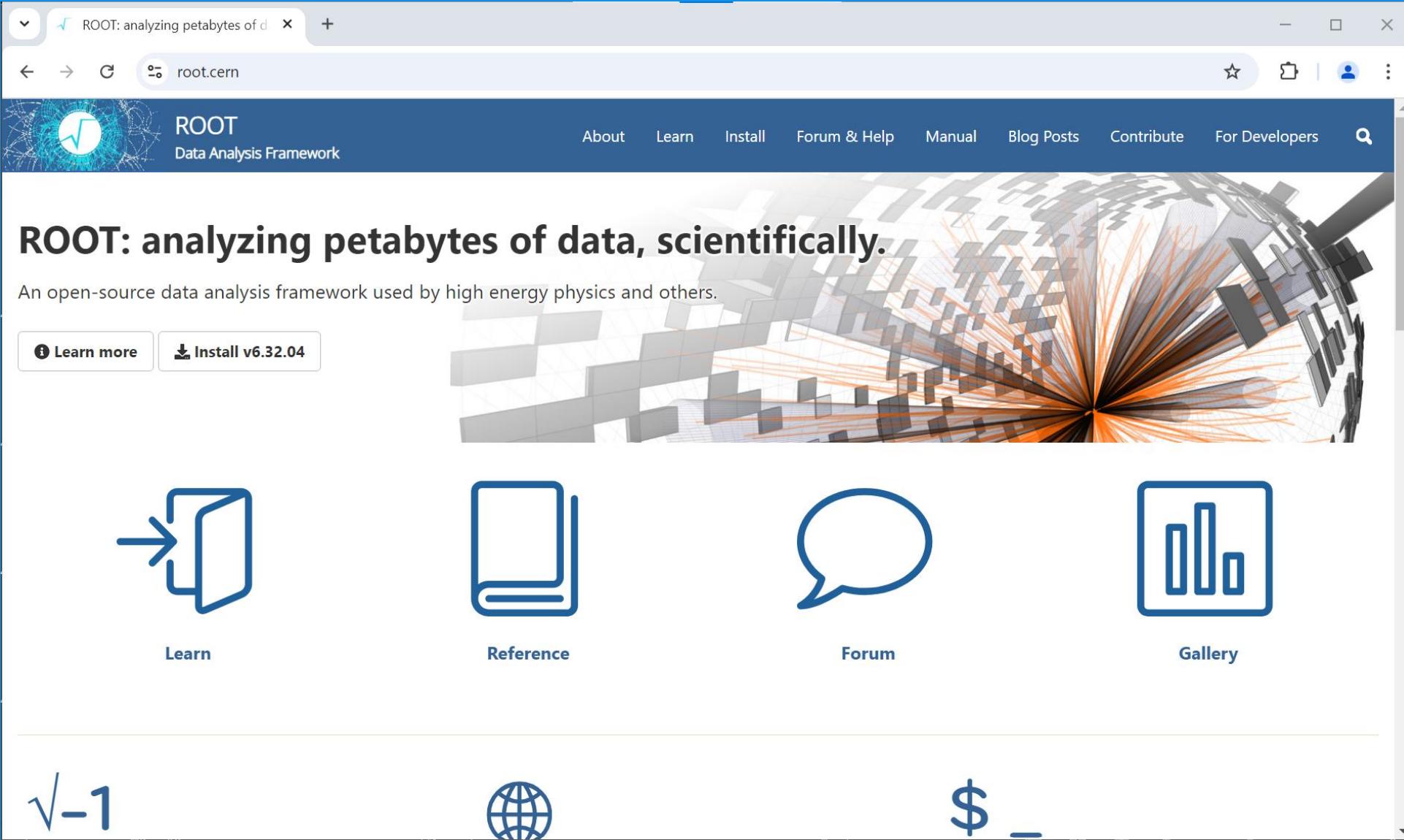
A large watermark-like text "Appendere output ad un file di testo" is centered over the terminal window.

Esercizio

1. Aprire il terminale Linux (Nativo o WSL);
2. Assicurarsi di essere nella cartella *home* dell'utente;
3. Creare la cartella *MCF* e spostarsi al suo interno;
4. Creare il file di testo *Nome_Cognome.txt* (sostituendo opportunamente);
5. Editare il file inserendo le seguenti informazioni:
 1. Nome;
 2. Cognome;
 3. Matricola;
 4. e-mail istituzionale;
6. Appendere output del comando *python3 --version* al file;
7. Inviare il file al docente via e-mail

ROOT

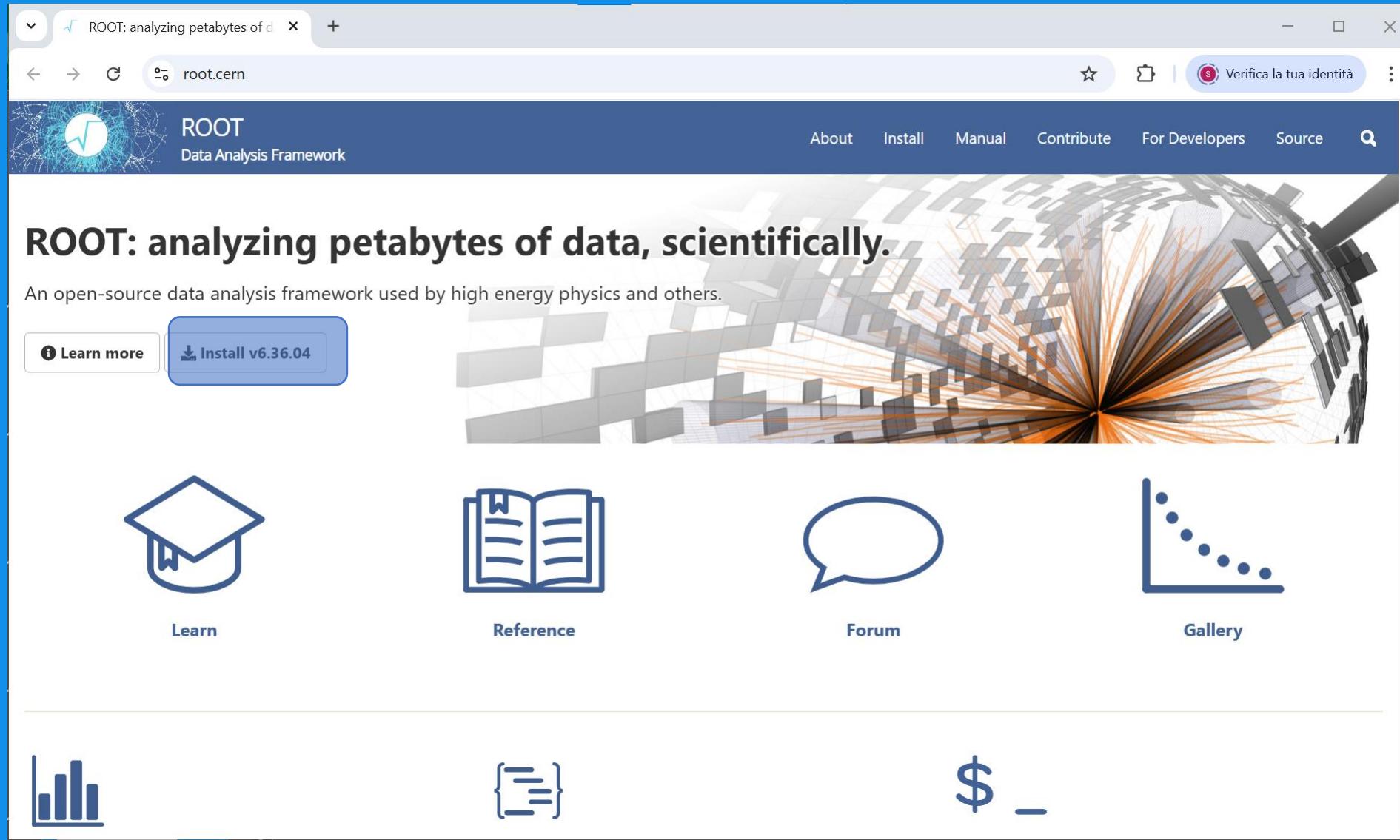
<https://root.cern/>



The screenshot shows the official website for the ROOT Data Analysis Framework. The URL in the browser bar is <https://root.cern/>. The page features a dark blue header with the ROOT logo and the text "Data Analysis Framework". Navigation links include About, Learn, Install, Forum & Help, Manual, Blog Posts, Contribute, For Developers, and a search icon. The main content area has a large banner with the text "ROOT: analyzing petabytes of data, scientifically." and a subtitle "An open-source data analysis framework used by high energy physics and others." Below the banner are two buttons: "Learn more" and "Install v6.32.04". To the right of the banner is a 3D visualization of particle tracks and a detector. Below the banner are four icons with labels: "Learn" (blue book icon), "Reference" (blue book icon), "Forum" (blue speech bubble icon), and "Gallery" (blue bar chart icon). At the bottom of the page are three footer icons: a blue square with a white minus sign and a blue dollar sign.

ROOT

<https://root.cern/>



The screenshot shows the official website for the ROOT Data Analysis Framework. The URL in the browser bar is <https://root.cern/>. The page features a large banner with the text "ROOT: analyzing petabytes of data, scientifically." and a subtitle "An open-source data analysis framework used by high energy physics and others." Below the banner are four main navigation links: "Learn", "Reference", "Forum", and "Gallery". Each link is accompanied by a blue icon. At the bottom of the page, there are three footer icons: a bar chart, a document with three horizontal lines, and a dollar sign followed by a blank space.

ROOT: analyzing petabytes of data, scientifically.

An open-source data analysis framework used by high energy physics and others.

[Learn more](#) [Install v6.36.04](#)

Learn 

Reference 

Forum 

Gallery 

Installing ROOT

ROOT is available on Linux, Mac, and Windows. To install it, we highly recommend (ordered by priority) either:

1. Use a package manager
2. Download a pre-compiled binary

Further ways to install ROOT on your computer are listed in the table of content on the right. Which one is best for you depends on your operating system and usage requirements.

In all cases, make sure to always use the most recent ROOT release possible to get the latest bug fixes, features and quick user support. The latest stable ROOT release is 6.32.04 (about ROOT versioning scheme).

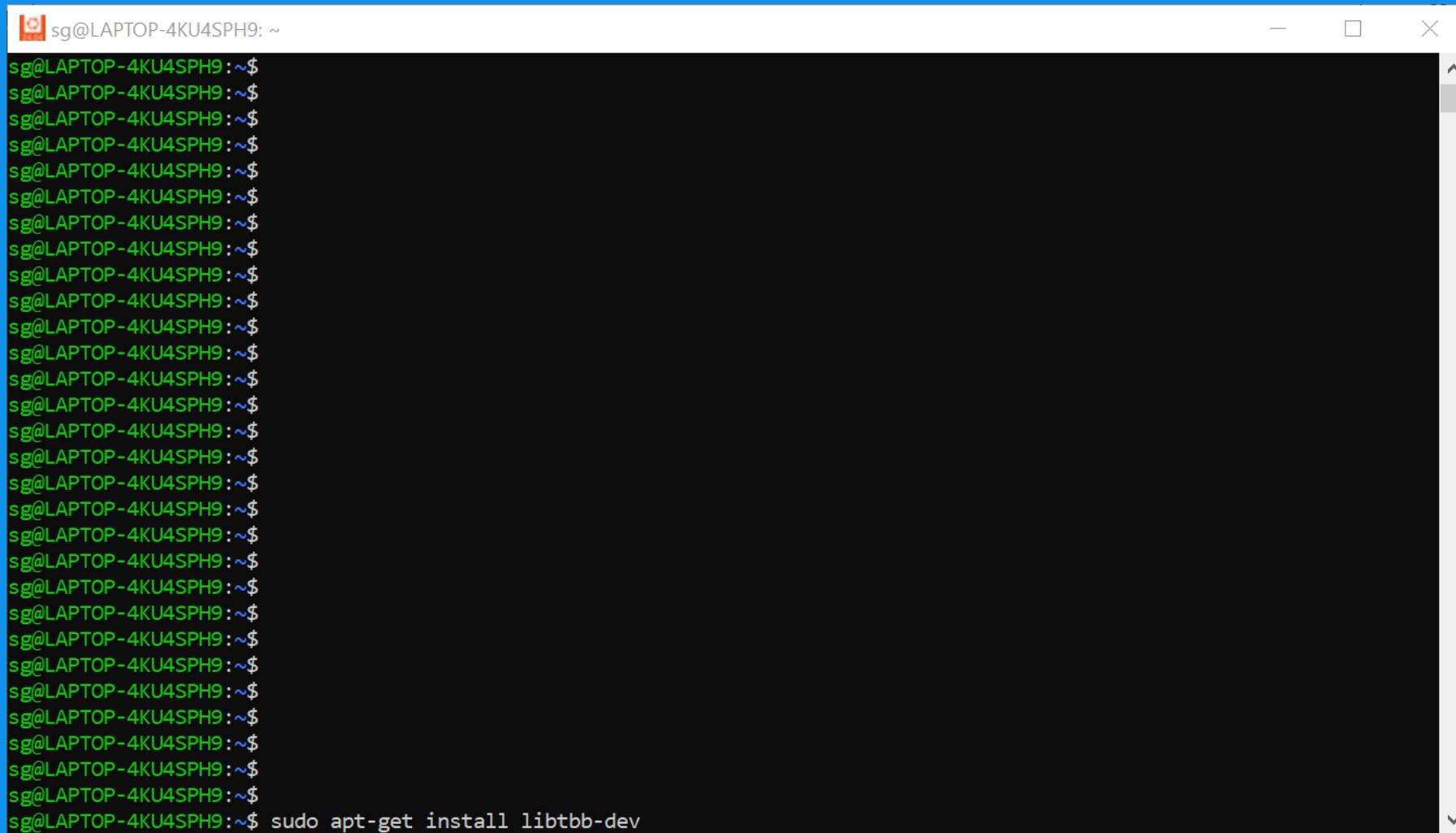
Download a pre-compiled binary distribution

We distribute pre-compiled ROOT for several major Linux distributions as well as MacOS and (as a beta) Windows. The steps to install a pre-compiled binary are simple:

1. Install all [required dependencies](#) with the system package manager
2. [Download the release](#) for the desired platform and ROOT version
3. Unpack the archive
4. Add the ROOT libraries and executables to your environment by sourcing the appropriate `thisroot.*` script. These setup scripts can be found in the ROOT binary release, in the `bin` directory.

ROOT - Prerequisiti

sudo apt-get install libtbb-dev



A screenshot of a terminal window titled "sg@LAPTOP-4KU4SPH9: ~". The window contains a single line of text: "sg@LAPTOP-4KU4SPH9:~\$ sudo apt-get install libtbb-dev". The terminal has a dark background with white text and a light gray scroll bar on the right side.

ROOT - Download

Release 6.36.04 - 2025-08-25

Release Notes

The release notes for this release can be found [here](#).

Binary distributions

Instead of manually downloading this binary, please explore first whether your [package manager](#) already provides this version. This way, you will automatically keep up-to-date with the latest stable versions with no manual maintenance on your side.

Platform	Files	Size
Almalinux 8.10	root_v6.36.04.Linux-almalinux8.10-x86_64-gcc8.5.tar.gz	276M
Almalinux 9.6	root_v6.36.04.Linux-almalinux9.6-x86_64-gcc11.5.tar.gz	296M
Almalinux 10.0	root_v6.36.04.Linux-almalinux10.0-x86_64-gcc14.2.tar.gz	305M
Debian 12	root_v6.36.04.Linux-debian12-x86_64-gcc12.2.tar.gz	283M
Fedora 41	root_v6.36.04.Linux-fedora41-x86_64-gcc14.3.tar.gz	285M
Fedora 42	root_v6.36.04.Linux-fedora42-x86_64-gcc15.2.tar.gz	304M
Ubuntu 22.04	root_v6.36.04.Linux-ubuntu22.04-x86_64-gcc11.4.tar.gz	286M
Ubuntu 24.04	root_v6.36.04.Linux-ubuntu24.04-x86_64-gcc13.3.tar.gz	282M
Ubuntu 25.04	root_v6.36.04.Linux-ubuntu25.04-x86_64-gcc14.2.tar.gz	285M
macOS 13.7 arm64 Xcode 15	root_v6.36.04.macos-13.7-arm64-clang150.pkg	408M
macOS 13.7 arm64 Xcode 15	root_v6.36.04.macos-13.7-arm64-clang150.tar.gz	268M

ROOT - Download

Release 6.36.04 - 2025-08-25

Release Notes

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Binary distributions

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Almalinux 10.0	root_v6.36.04.Linux-almalinux10.0-x86_64-gcc14.2.tar.gz	305M
Debian 12	root_v6.36.04.Linux-debian12-x86_64-gcc12.2.tar.gz	283M
Fedora 41	root_v6.36.04.Linux-fedora41-x86_64-gcc14.3.tar.gz	285M
Fedora 42	root_v6.36.04.Linux-fedora42-x86_64-gcc15.2.tar.gz	304M
Ubuntu 22.04	root_v6.36.04.Linux-ubuntu22.04-x86_64-gcc11.4.tar.gz	286M
Ubuntu 24.04	root_v6.36.04.Linux-ubuntu24.04-x86_64-gcc13.3.tar.gz	282M
Ubuntu 25.04	root_v6.36.04.Linux-ubuntu25.04-x86_64-gcc14.2.tar.gz	285M
macOS 13.7 arm64 Xcode 15	root_v6.36.04.macos-13.7-arm64-clang150.pkg	408M
macOS 13.7 arm64 Xcode 15	root_v6.36.04.macos-13.7-arm64-clang150.tar.gz	268M

Click tasto destro



Useful links

All releases

Release 6.36.04 - 2025-08-25

Release Notes

The release notes for this release can be found [here](#).

Binary distributions

Instead of manually downloading this binary, please explore first whether your [package manager](#) already provides this version. This way, you will automatically keep up-to-date with the latest stable versions with no manual maintenance on your side.

Platform	Files	
Almalinux 8.10	root_v6.36.04.Lin	
Almalinux 9.6	root_v6.36.04.Lin	
Almalinux 10.0	root_v6.36.04.Lin	
Debian 12	root_v6.36.04.Lin	
Fedora 41	root_v6.36.04.Lin	
Fedora 42	root_v6.36.04.Lin	
Ubuntu 22.04	root_v6.36.04.Lin	
Ubuntu 24.04	root_v6.36.04.Linux-ubuntu24.04-x86_64-gcc13.3.tar.gz 282M	
Ubuntu 25.04	root_v6.36.04.Linux-ubuntu25.04-x86_64-gcc14.2.tar.gz 285M	
macOS 13.7 arm64 Xcode 15	root_v6.36.04.macos-13.7-arm64-clang150.pkg 408M	
macOS 13.7 arm64 Xcode 15	root_v6.36.04.macos-13.7-arm64-clang150.tar.gz 268M	

- Apri link in un'altra scheda
- Apri link in un'altra finestra
- Apri link in finestra di navigazione in incognito
- Salva link con nome...
- Copia indirizzo link

Ispeziona



Cerca

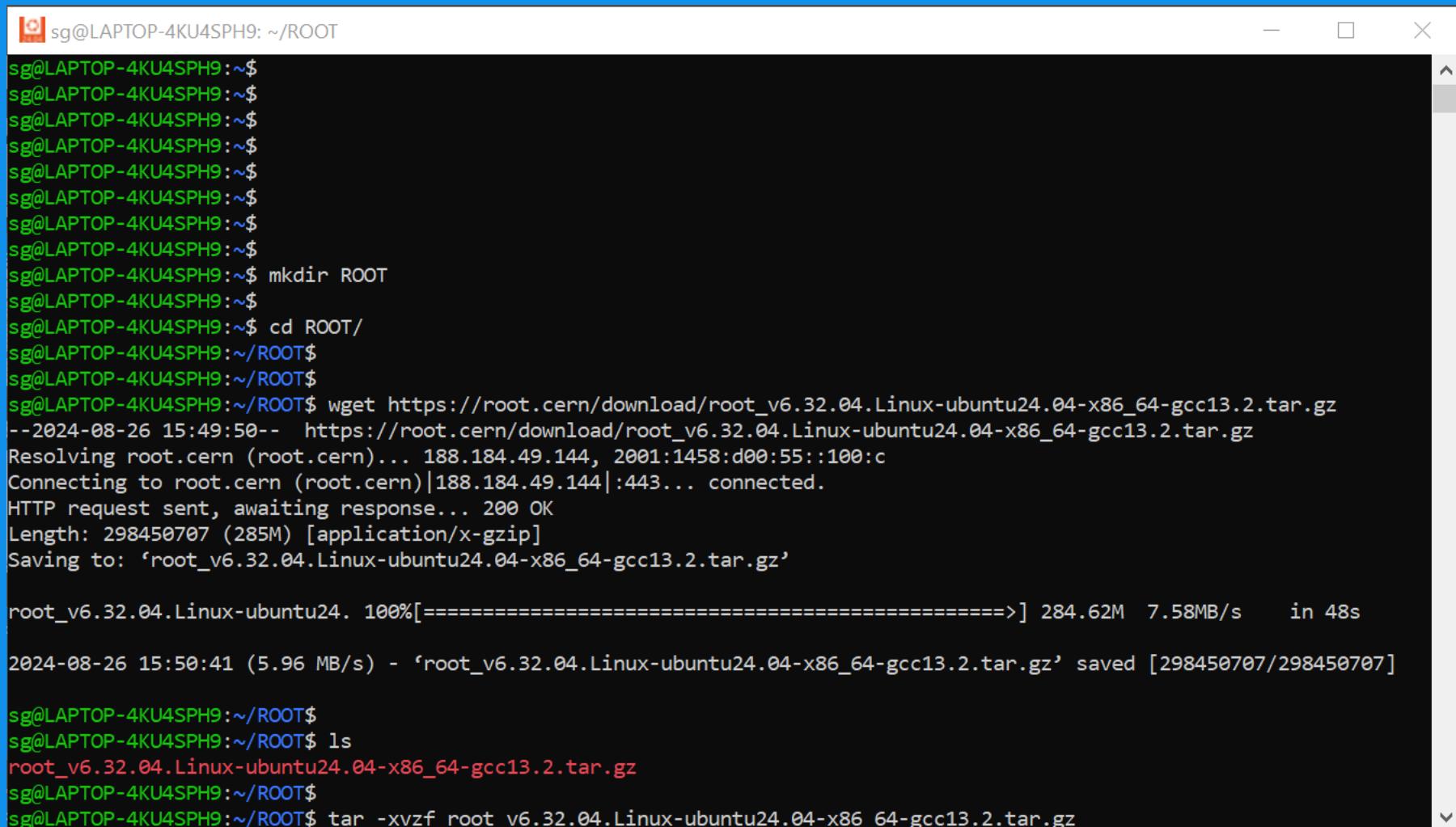


20:06
30/09/2025



ROOT – Installazione

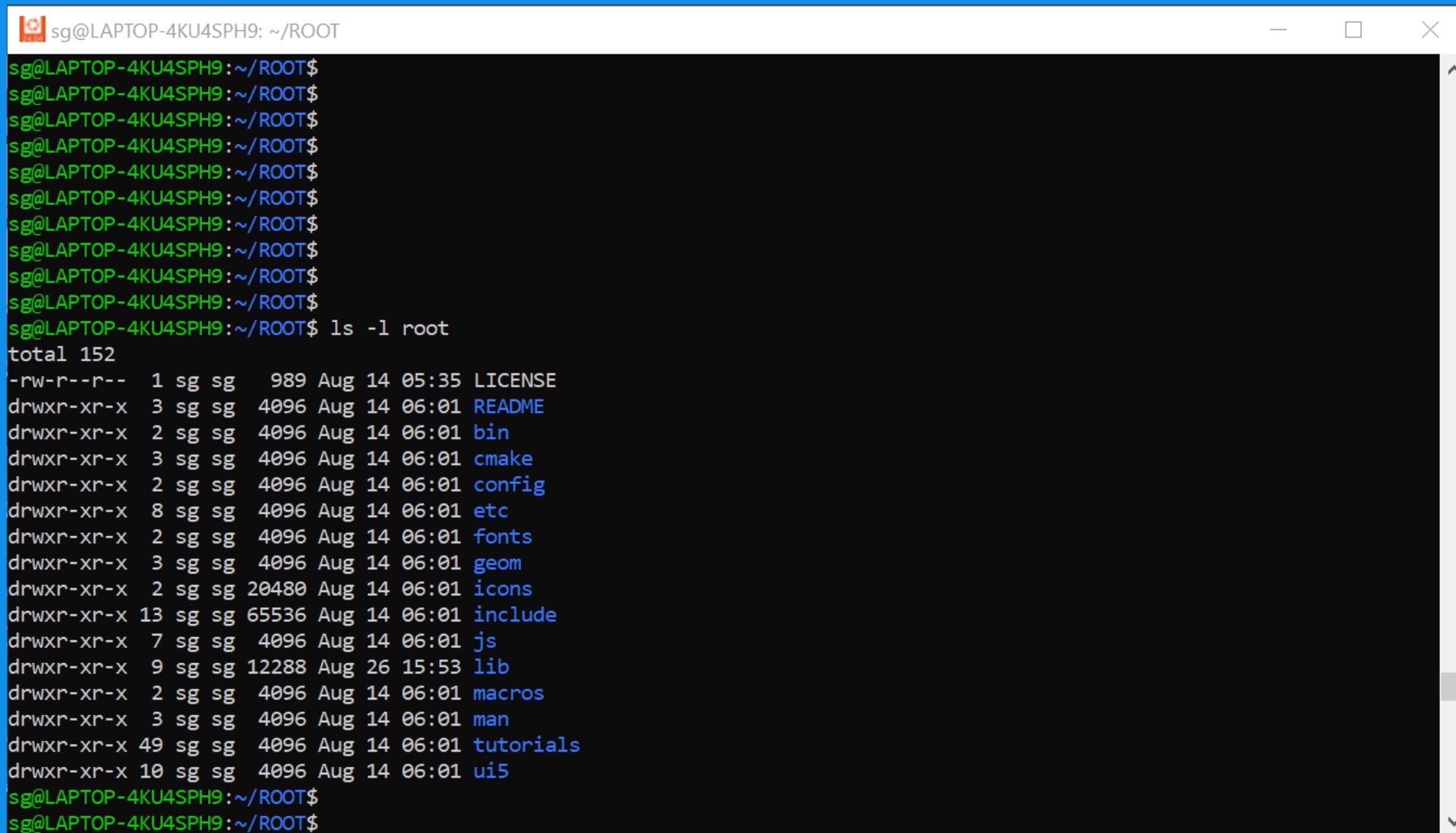
ROOT – Istallazione



The screenshot shows a terminal window with a blue header bar containing the title 'sg@LAPTOP-4KU4SPH9: ~/ROOT'. The main area of the terminal displays the following command-line session:

```
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ mkdir ROOT  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ cd ROOT/  
sg@LAPTOP-4KU4SPH9:~/ROOT$  
sg@LAPTOP-4KU4SPH9:~/ROOT$  
sg@LAPTOP-4KU4SPH9:~/ROOT$ wget https://root.cern/download/root_v6.32.04.Linux-ubuntu24.04-x86_64-gcc13.2.tar.gz  
--2024-08-26 15:49:50-- https://root.cern/download/root_v6.32.04.Linux-ubuntu24.04-x86_64-gcc13.2.tar.gz  
Resolving root.cern (root.cern)... 188.184.49.144, 2001:1458:d00:55::100:c  
Connecting to root.cern (root.cern)|188.184.49.144|:443... connected.  
HTTP request sent, awaiting response... 200 OK  
Length: 298450707 (285M) [application/x-gzip]  
Saving to: 'root_v6.32.04.Linux-ubuntu24.04-x86_64-gcc13.2.tar.gz'  
  
root_v6.32.04.Linux-ubuntu24. 100%[=====] 284.62M 7.58MB/s in 48s  
  
2024-08-26 15:50:41 (5.96 MB/s) - 'root_v6.32.04.Linux-ubuntu24.04-x86_64-gcc13.2.tar.gz' saved [298450707/298450707]  
  
sg@LAPTOP-4KU4SPH9:~/ROOT$  
sg@LAPTOP-4KU4SPH9:~/ROOT$ ls  
root_v6.32.04.Linux-ubuntu24.04-x86_64-gcc13.2.tar.gz  
sg@LAPTOP-4KU4SPH9:~/ROOT$  
sg@LAPTOP-4KU4SPH9:~/ROOT$ tar -xvzf root_v6.32.04.Linux-ubuntu24.04-x86_64-gcc13.2.tar.gz
```

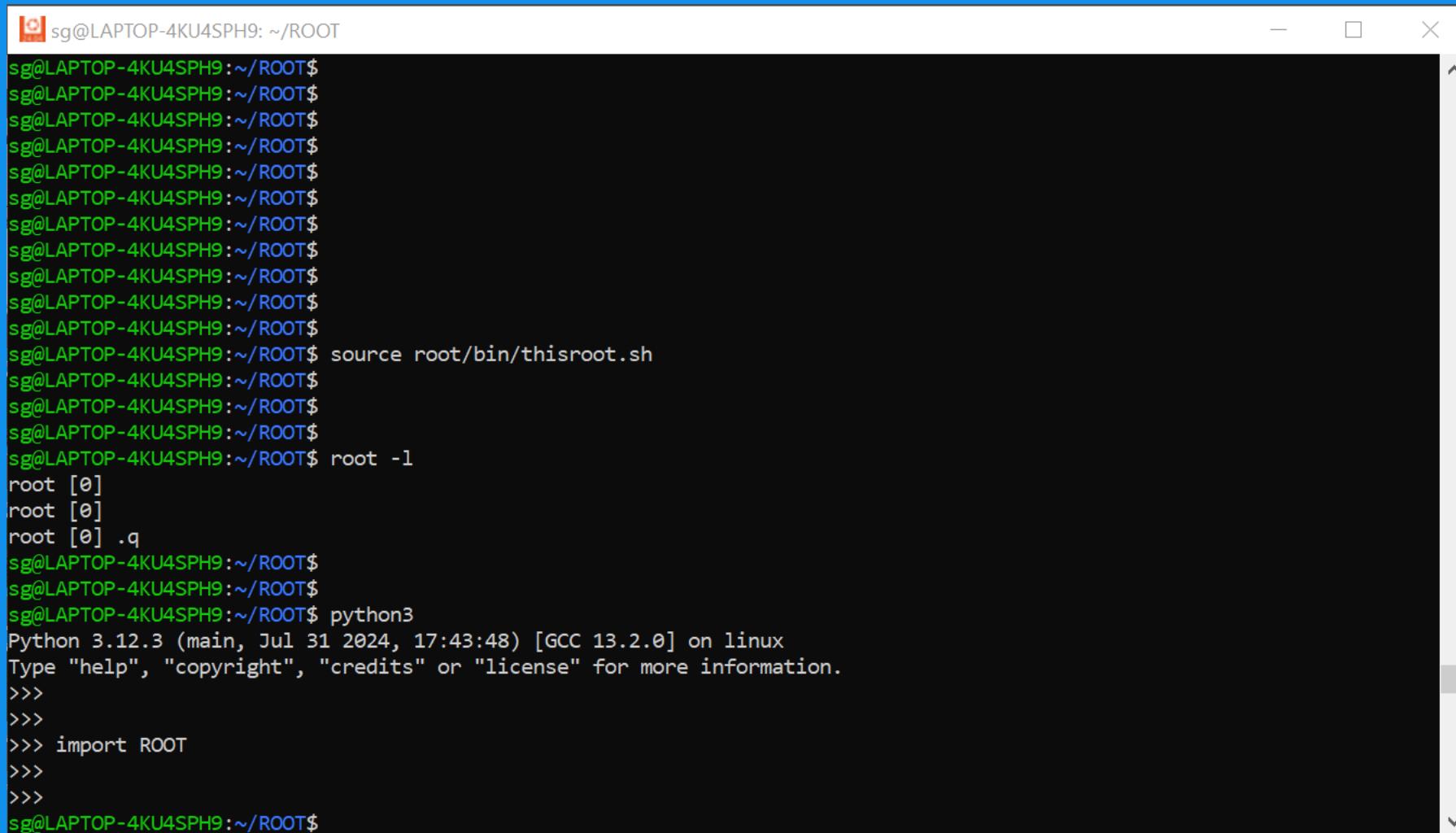
ROOT – Istallazione



The screenshot shows a terminal window with the following content:

```
sg@LAPTOP-4KU4SPH9: ~/ROOT$  
sg@LAPTOP-4KU4SPH9:~/ROOT$  
sg@LAPTOP-4KU4SPH9:~/ROOT$ ls -l root  
total 152  
-rw-r--r-- 1 sg sg 989 Aug 14 05:35 LICENSE  
drwxr-xr-x 3 sg sg 4096 Aug 14 06:01 README  
drwxr-xr-x 2 sg sg 4096 Aug 14 06:01 bin  
drwxr-xr-x 3 sg sg 4096 Aug 14 06:01 cmake  
drwxr-xr-x 2 sg sg 4096 Aug 14 06:01 config  
drwxr-xr-x 8 sg sg 4096 Aug 14 06:01 etc  
drwxr-xr-x 2 sg sg 4096 Aug 14 06:01 fonts  
drwxr-xr-x 3 sg sg 4096 Aug 14 06:01 geom  
drwxr-xr-x 2 sg sg 20480 Aug 14 06:01 icons  
drwxr-xr-x 13 sg sg 65536 Aug 14 06:01 include  
drwxr-xr-x 7 sg sg 4096 Aug 14 06:01 js  
drwxr-xr-x 9 sg sg 12288 Aug 26 15:53 lib  
drwxr-xr-x 2 sg sg 4096 Aug 14 06:01 macros  
drwxr-xr-x 3 sg sg 4096 Aug 14 06:01 man  
drwxr-xr-x 49 sg sg 4096 Aug 14 06:01 tutorials  
drwxr-xr-x 10 sg sg 4096 Aug 14 06:01 ui5  
sg@LAPTOP-4KU4SPH9:~/ROOT$  
sg@LAPTOP-4KU4SPH9:~/ROOT$
```

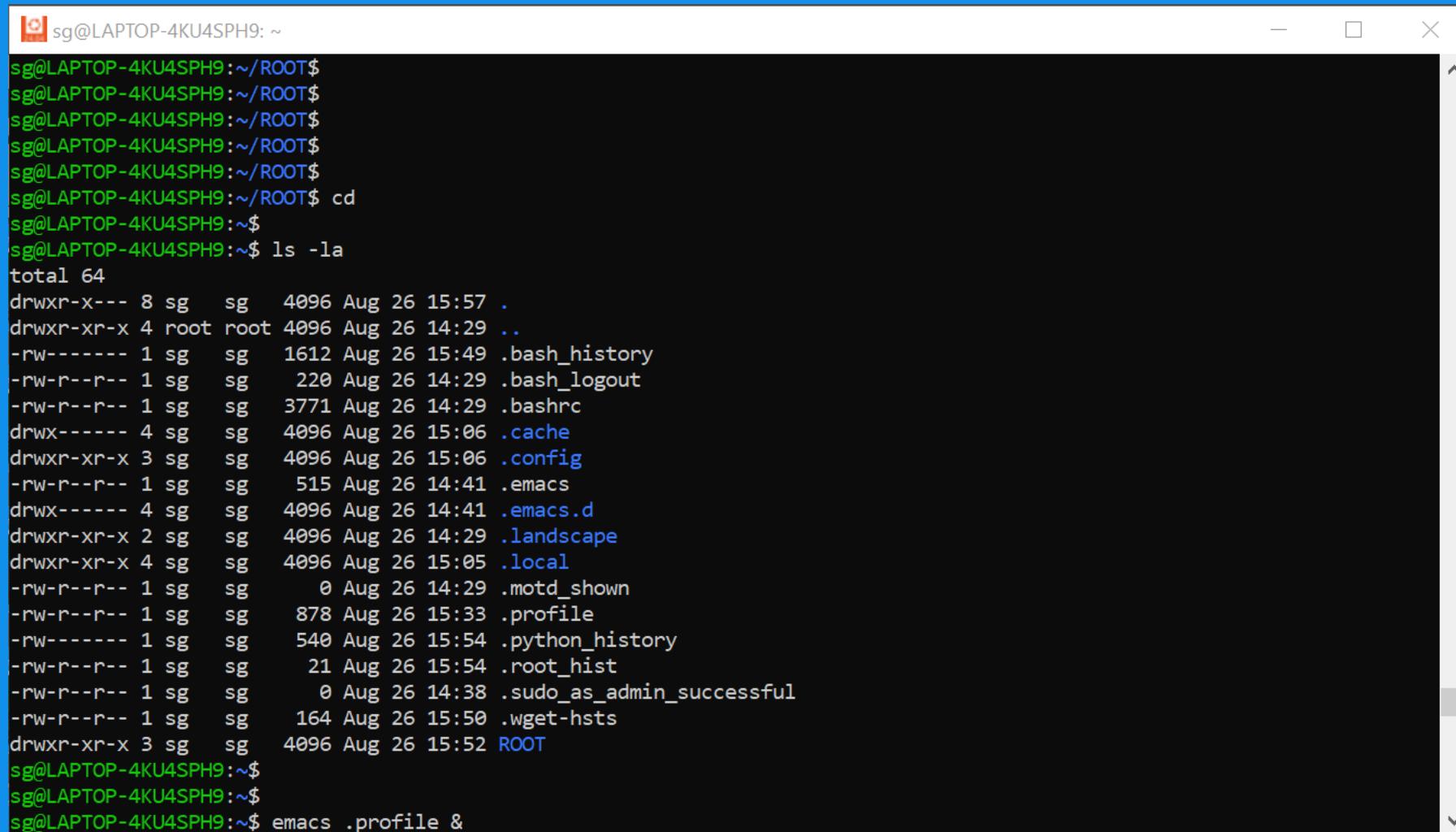
ROOT – controllo installazione



The screenshot shows a terminal window with the following session:

```
sg@LAPTOP-4KU4SPH9: ~/ROOT$  
sg@LAPTOP-4KU4SPH9: ~/ROOT$ source root/bin/thisroot.sh  
sg@LAPTOP-4KU4SPH9: ~/ROOT$  
sg@LAPTOP-4KU4SPH9: ~/ROOT$  
sg@LAPTOP-4KU4SPH9: ~/ROOT$  
sg@LAPTOP-4KU4SPH9: ~/ROOT$ root -l  
root [0]  
root [0]  
root [0] .q  
sg@LAPTOP-4KU4SPH9: ~/ROOT$  
sg@LAPTOP-4KU4SPH9: ~/ROOT$  
sg@LAPTOP-4KU4SPH9: ~/ROOT$ python3  
Python 3.12.3 (main, Jul 31 2024, 17:43:48) [GCC 13.2.0] on linux  
Type "help", "copyright", "credits" or "license" for more information.  
>>>  
>>>  
>>> import ROOT  
>>>  
>>>  
sg@LAPTOP-4KU4SPH9: ~/ROOT$
```

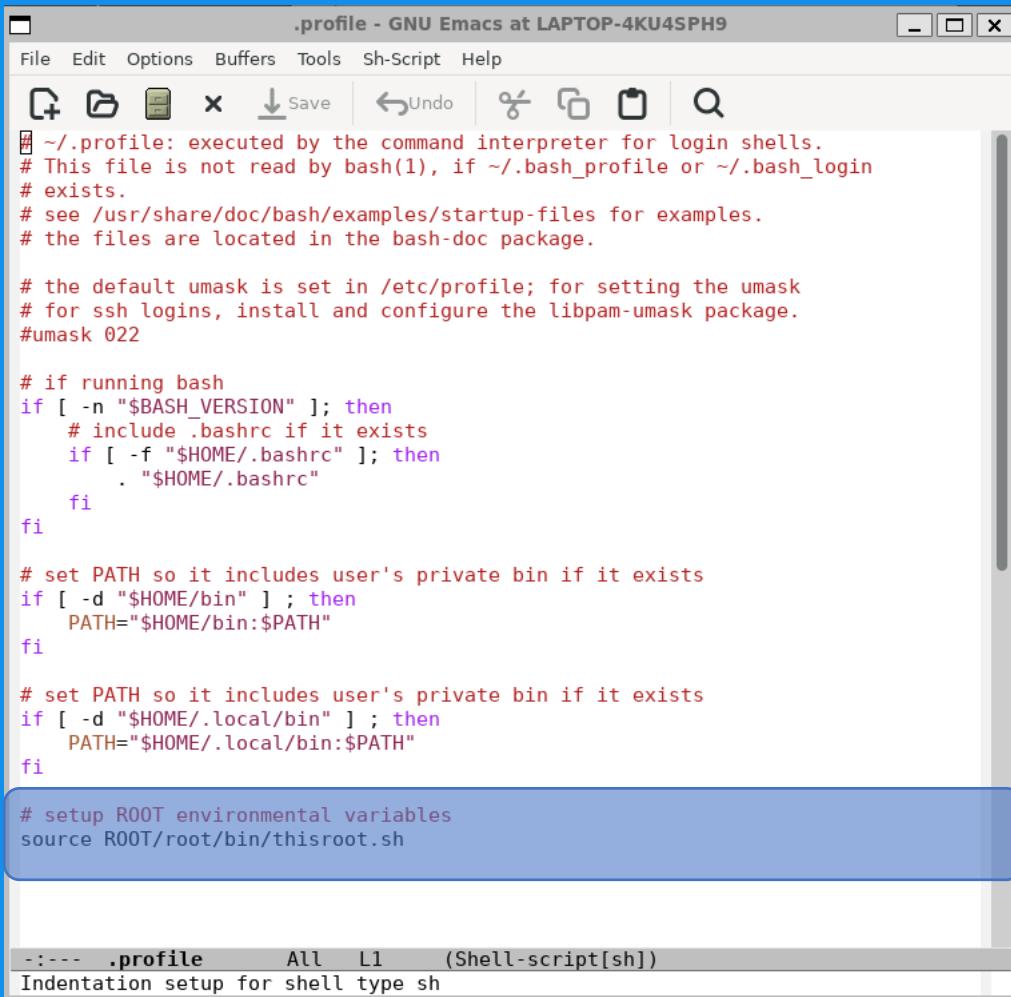
ROOT – attivazione automatica



The screenshot shows a terminal window with the following content:

```
sg@LAPTOP-4KU4SPH9: ~
sg@LAPTOP-4KU4SPH9:~/ROOT$ 
sg@LAPTOP-4KU4SPH9:~/ROOT$ 
sg@LAPTOP-4KU4SPH9:~/ROOT$ 
sg@LAPTOP-4KU4SPH9:~/ROOT$ 
sg@LAPTOP-4KU4SPH9:~/ROOT$ 
sg@LAPTOP-4KU4SPH9:~/ROOT$ cd
sg@LAPTOP-4KU4SPH9:~$ 
sg@LAPTOP-4KU4SPH9:~$ ls -la
total 64
drwxr-x--- 8 sg    sg   4096 Aug 26 15:57 .
drwxr-xr-x  4 root  root 4096 Aug 26 14:29 ..
-rw-----  1 sg    sg   1612 Aug 26 15:49 .bash_history
-rw-r--r--  1 sg    sg    220 Aug 26 14:29 .bash_logout
-rw-r--r--  1 sg    sg   3771 Aug 26 14:29 .bashrc
drwx----- 4 sg    sg   4096 Aug 26 15:06 .cache
drwxr-xr-x  3 sg    sg   4096 Aug 26 15:06 .config
-rw-r--r--  1 sg    sg     515 Aug 26 14:41 .emacs
drwx----- 4 sg    sg   4096 Aug 26 14:41 .emacs.d
drwxr-xr-x  2 sg    sg   4096 Aug 26 14:29 .landscape
drwxr-xr-x  4 sg    sg   4096 Aug 26 15:05 .local
-rw-r--r--  1 sg    sg      0 Aug 26 14:29 .motd_shown
-rw-r--r--  1 sg    sg    878 Aug 26 15:33 .profile
-rw-----  1 sg    sg    540 Aug 26 15:54 .python_history
-rw-r--r--  1 sg    sg     21 Aug 26 15:54 .root_hist
-rw-r--r--  1 sg    sg      0 Aug 26 14:38 .sudo_as_admin_successful
-rw-r--r--  1 sg    sg    164 Aug 26 15:50 .wget-hsts
drwxr-xr-x  3 sg    sg   4096 Aug 26 15:52 ROOT
sg@LAPTOP-4KU4SPH9:~$ 
sg@LAPTOP-4KU4SPH9:~$ emacs .profile &
```

ROOT – attivazione automatica



```
.profile - GNU Emacs at LAPTOP-4KU4SPH9
File Edit Options Buffers Tools Sh-Script Help
Save Undo Cut Copy Paste Find
# ~/.profile: executed by the command interpreter for login shells.
# This file is not read by bash(1), if ~/.bash_profile or ~/.bash_login
# exists.
# see /usr/share/doc/bash/examples/startup-files for examples.
# the files are located in the bash-doc package.

# the default umask is set in /etc/profile; for setting the umask
# for ssh logins, install and configure the libpam-umask package.
#umask 022

# if running bash
if [ -n "$BASH_VERSION" ]; then
    # include .bashrc if it exists
    if [ -f "$HOME/.bashrc" ]; then
        . "$HOME/.bashrc"
    fi
fi

# set PATH so it includes user's private bin if it exists
if [ -d "$HOME/bin" ] ; then
    PATH="$HOME/bin:$PATH"
fi

# set PATH so it includes user's private bin if it exists
if [ -d "$HOME/.local/bin" ] ; then
    PATH="$HOME/.local/bin:$PATH"
fi

# setup ROOT environmental variables
source ROOT/root/bin/thisroot.sh

----- .profile      All   L1  (Shell-script[sh])
Indentation setup for shell type sh
```

Righe da aggiungere

ROOT - Test

- Chiudere e riaprire Ubuntu (o aprire un altro terminale)
- Aprire il prompt python
- Eseguire i seguenti comandi:

```
import ROOT  
hh = ROOT.TH1F("hh", "My Histogram", 100, 0, 1)  
hh.Draw()
```

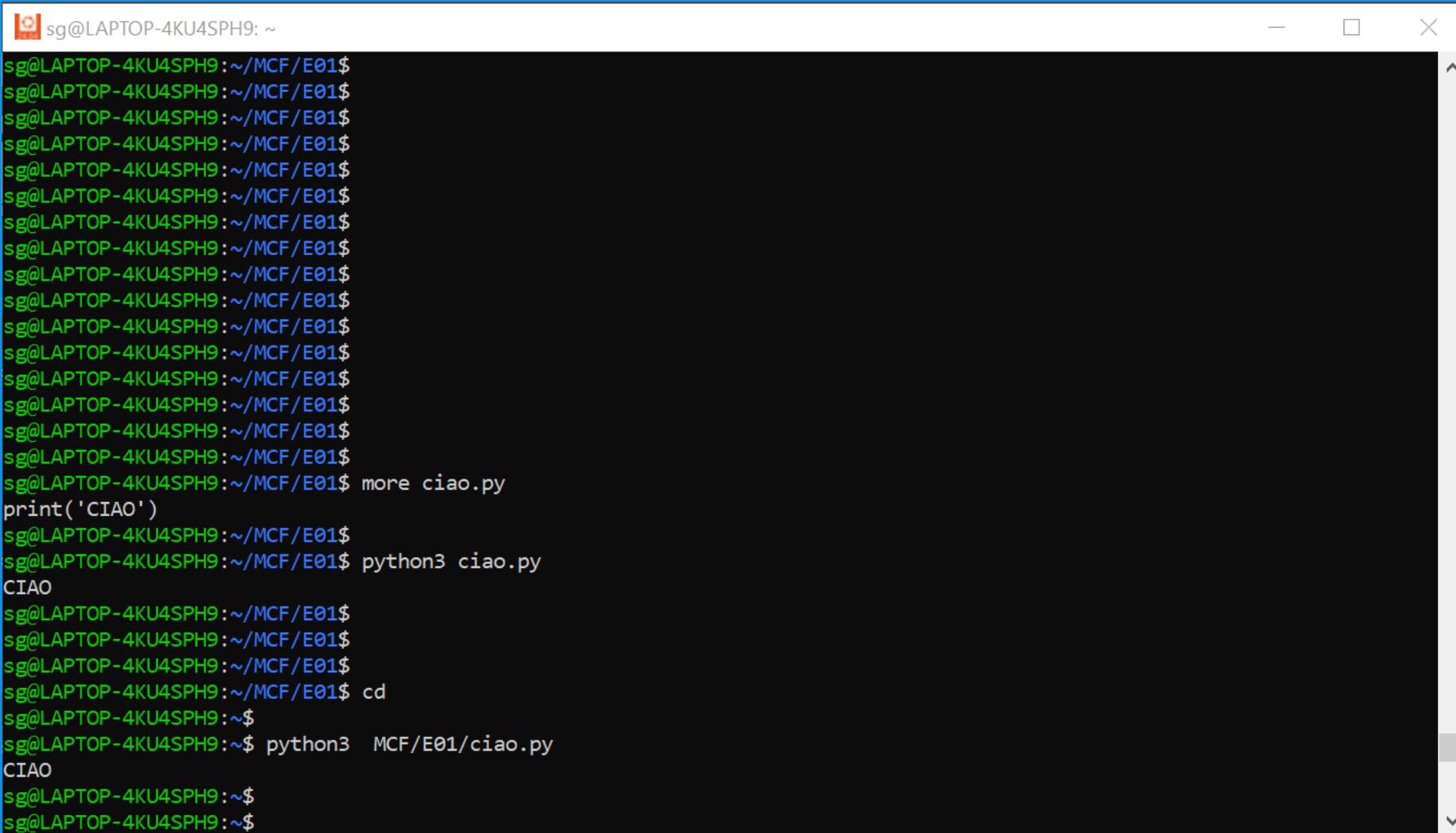
```
sg@LAPTOP-4KU4SPH9:~$ python3  
Python 3.12.3 (main, Jul 31 2024, 17:43:48) [GCC 13.2.0] on linux  
Type "help", "copyright", "credits" or "license" for more information.  
>>>  
>>> import ROOT  
>>>  
>>>  
>>> hh = ROOT.TH1F("hh", "My Histogram", 100, 0, 1)  
>>>  
>>> hh.Draw()  
Info in <TCanvas::MakeDefCanvas>: created default TCanvas with name c1  
>>>
```

Esercizio 2

1. Aprire il terminale Linux (Nativo o WSL);
2. Spostarsi all'interno della cartella *MCF* precedentemente creata;
3. Creare la sottocartella *E01* e spostarsi al suo interno;
4. Creare il file di testo *ciao.py* (script python);
5. Editare il file inserendo la seguente istruzione:

```
print('CIAO!')
```
6. Assicurarsi di aver salvato correttamente il file
 - Eventualmente provare il comando:
less ciao.py
7. Eseguire lo script python nel prompt dei comandi attraverso:
python3 ciao.py
8. Spostarsi nella cartella *home* ed eseguire lo script tramite il comando;
python3 MCF/E01/ciao.py

Esercizio 2



The screenshot shows a terminal window with a blue header bar containing a small orange icon and the text "sg@LAPTOP-4KU4SPH9: ~". The main area of the terminal is black and displays the following text:

```
sg@LAPTOP-4KU4SPH9:~/MCF/E01$  
sg@LAPTOP-4KU4SPH9:~/MCF/E01$ more ciao.py  
print('CIAO')  
sg@LAPTOP-4KU4SPH9:~/MCF/E01$  
sg@LAPTOP-4KU4SPH9:~/MCF/E01$ python3 ciao.py  
CIAO  
sg@LAPTOP-4KU4SPH9:~/MCF/E01$  
sg@LAPTOP-4KU4SPH9:~/MCF/E01$  
sg@LAPTOP-4KU4SPH9:~/MCF/E01$  
sg@LAPTOP-4KU4SPH9:~/MCF/E01$ cd  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$ python3 MCF/E01/ciao.py  
CIAO  
sg@LAPTOP-4KU4SPH9:~$  
sg@LAPTOP-4KU4SPH9:~$
```