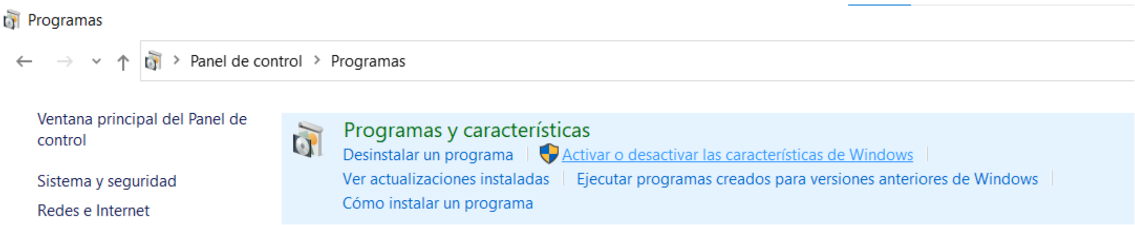
Instructions to install Linux on Windows 10 as well as the required programs for the Nuclear Reactions course

Windows 10 provides a Linux environment with the base installation, although it must be activated. In order to do so one must go to

Control Panel/Programs/Activate or deactivate Windows features



Programas

Panel de control > Programas

Ventana principal del Panel de control

Sistema y seguridad

Redes e Internet

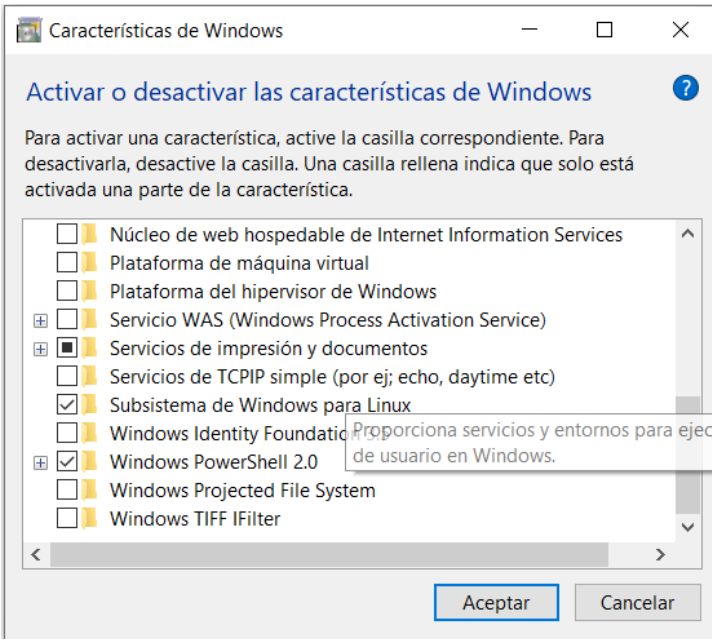
Programas y características

Desinstalar un programa | Activar o desactivar las características de Windows |

Ver actualizaciones instaladas | Ejecutar programas creados para versiones anteriores de Windows |

Cómo instalar un programa

In the opened window the option *Windows Subsystem for Linux* must be activated



Características de Windows

Activar o desactivar las características de Windows

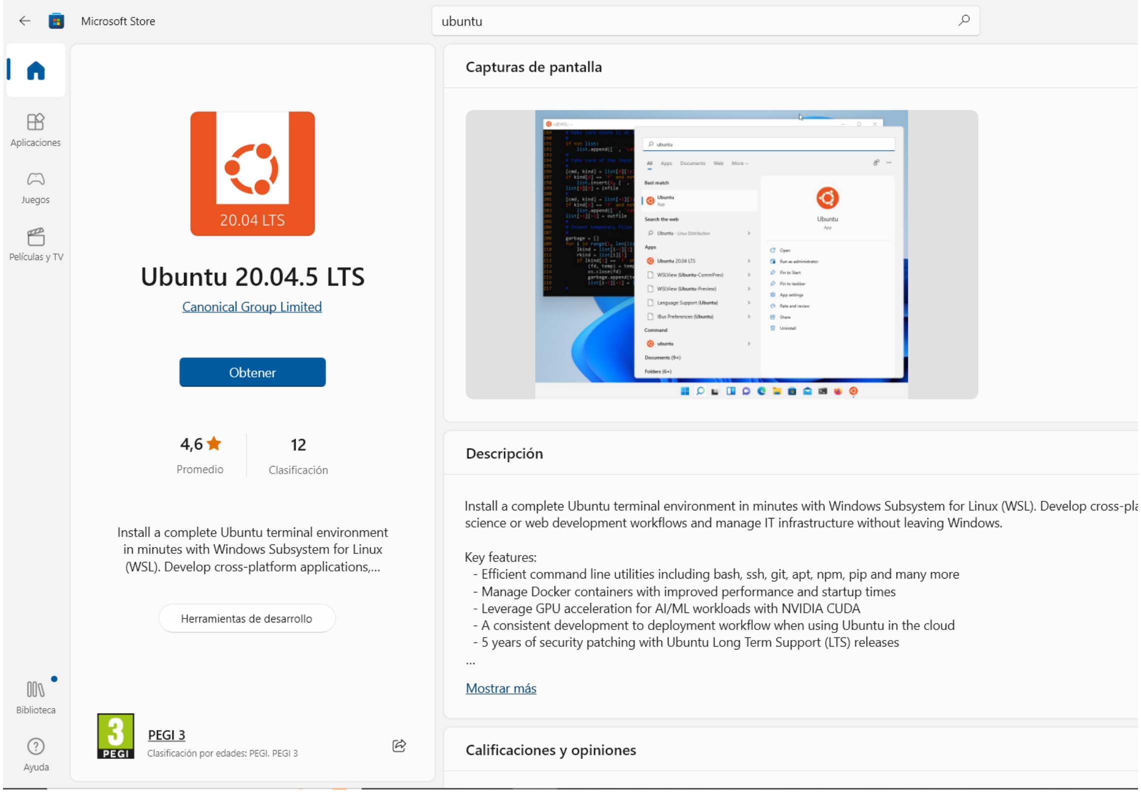
Para activar una característica, active la casilla correspondiente. Para desactivarla, desactive la casilla. Una casilla rellena indica que solo está activada una parte de la característica.

- □ Núcleo de web hospedable de Internet Information Services
- □ Plataforma de máquina virtual
- □ Plataforma del hipervisor de Windows
- ⊞ □ Servicio WAS (Windows Process Activation Service)
- ⊞ ■ Servicios de impresión y documentos
- □ Servicios de TCPIP simple (por ej; echo, daytime etc)
- ☑ Subsistema de Windows para Linux
- □ Windows Identity Foundatio
- ⊞ ☑ Windows PowerShell 2.0
- □ Windows Projected File System
- □ Windows TIFF IFilter

Proporciona servicios y entornos para ejec
de usuario en Windows.

Afterwards the computer must be rebooted for the changes to take place.

After reboot, an image for the Linux distribution must be downloaded. They can be easily accessed through the Microsoft Store, just search for “Ubuntu”. We will choose the Ubuntu 20.04 distrbution.



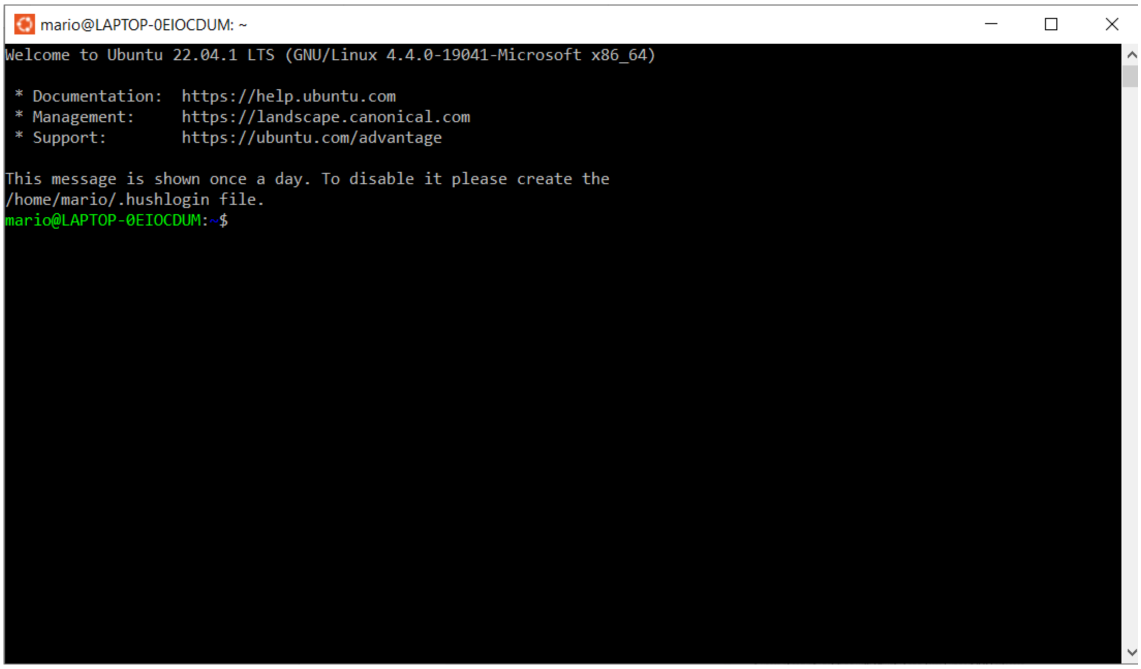
Install a complete Ubuntu terminal environment in minutes with Windows Subsystem for Linux (WSL). Develop cross-platform applications,...

Install a complete Ubuntu terminal environment in minutes with Windows Subsystem for Linux (WSL). Develop cross-pla
science or web development workflows and manage IT infrastructure without leaving Windows.

Key features:
- Efficient command line utilities including bash, ssh, git, apt, npm, pip and many more
- Manage Docker containers with improved performance and startup times
- Leverage GPU acceleration for AI/ML workloads with NVIDIA CUDA
- A consistent development to deployment workflow when using Ubuntu in the cloud
- 5 years of security patching with Ubuntu Long Term Support (LTS) releases

...

After installation, we can run the new Ubuntu program. It will open a terminal where we will have to introduce the username and password that will be used within Ubuntu. This will be the root account, the only one able to install programs within Ubuntu, so this password must not be lost.



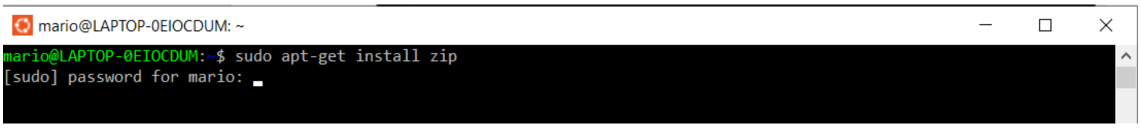
```
Welcome to Ubuntu 22.04.1 LTS (GNU/Linux 4.4.0-19041-Microsoft x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

This message is shown once a day. To disable it please create the
/home/mario/.hushlogin file.
mario@LAPTOP-0EIOCDUM:~$
```

After login, we will need three programs to be installed: gfortran, make and zip. This can be installed as root user through the following commands:

sudo apt-get install gfortran

sudo apt-get install make

sudo apt-get install zip



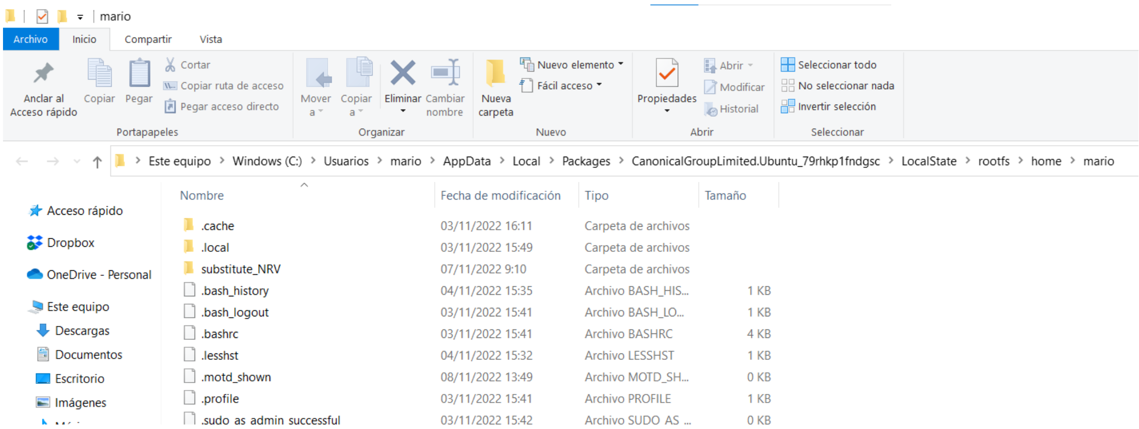
```
mario@LAPTOP-0EIOCDUM:~$ sudo apt-get install zip
[sudo] password for mario:
```

Press Enter after a command to run it. The sudo command allows the user to input commands reserved for the root user, but the first time it is used it will require to input the root password.

The files generated in the home folder in this Ubuntu application can be found in the following folder in Windows:

C:\Users\USER\AppData\Local\Packages\CanonicalGroupLimited.Ubuntu_79rhkp1fndgsc\LocalState\rootfs\home\USER_UBUNTU

Where USER is the name of the Windows user while USER_UBUNTU is the name of the user we created in Ubuntu. The name CanonicalGroupLimited.Ubuntu_79rhkp1fndgsc may change with the Ubuntu distribution, although it should not be too different. To access this folder from Windows Explorer, the visualization of hidden files may have to be habilitated.



Este equipo > Windows (C:) > Usuarios > mario > AppData > Local > Packages > CanonicalGroupLimited.Ubuntu_79rhkp1fndgsc > LocalState > rootfs > home > mario

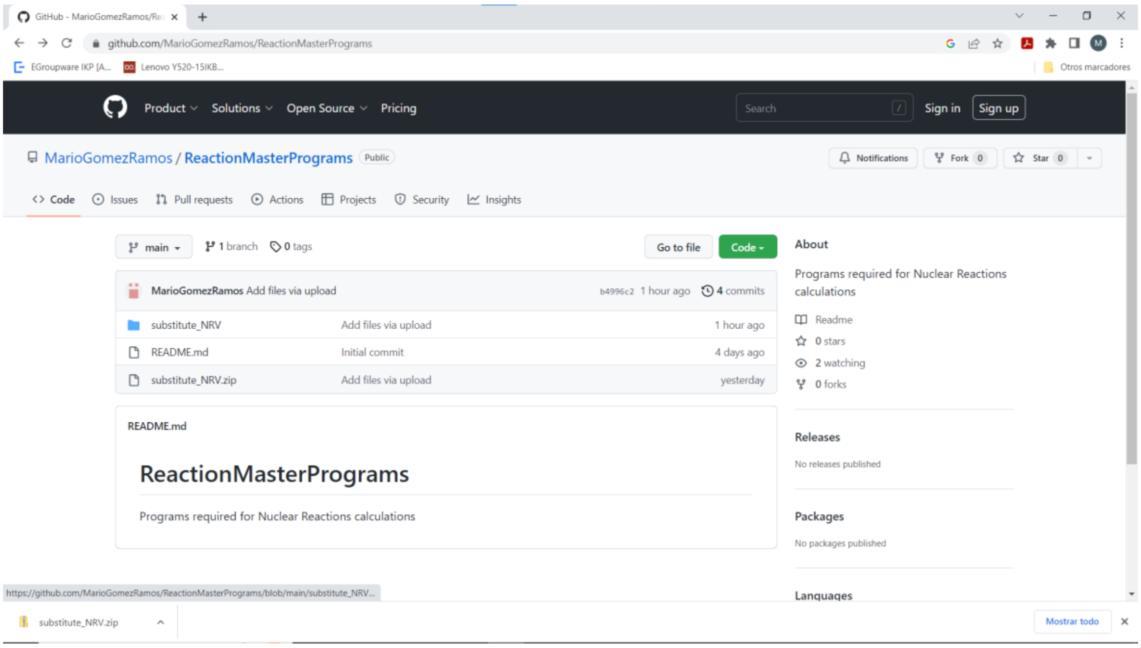
Nombre	Fecha de modificación	Tipo	Tamaño
.cache	03/11/2022 16:11	Carpeta de archivos	
.local	03/11/2022 15:49	Carpeta de archivos	
substitute_NRV	07/11/2022 9:10	Carpeta de archivos	
.bash_history	04/11/2022 15:35	Archivo BASH_HIS...	1 KB
.bash_logout	03/11/2022 15:41	Archivo BASH_LO...	1 KB
.bashrc	03/11/2022 15:41	Archivo BASHRC	4 KB
.lesshst	04/11/2022 15:32	Archivo LESSHST	1 KB
.motd_shown	08/11/2022 13:49	Archivo MOTD_SH...	0 KB
.profile	03/11/2022 15:41	Archivo PROFILE	1 KB
.sudo_as_admin_successful	03/11/2022 15:42	Archivo SUDO_AS ...	0 KB

It may be useful to generate a direct access to this folder in the desktop for ease of access. We will now close the Ubuntu application by typing

exit

and download (in Windows) the file with the programs required for this course from the website

https://github.com/MarioGomezRamos/ReactionMasterPrograms



MarioGomezRamos / ReactionMasterPrograms Public

MarioGomezRamos Add files via upload b4996c2 1 hour ago 4 commits

substitute_NRV	Add files via upload	1 hour ago
README.md	Initial commit	4 days ago
substitute_NRV.zip	Add files via upload	yesterday

README.md

ReactionMasterPrograms

Programs required for Nuclear Reactions calculations

About

Programs required for Nuclear Reactions calculations

Readme

0 stars

2 watching

0 forks

Releases

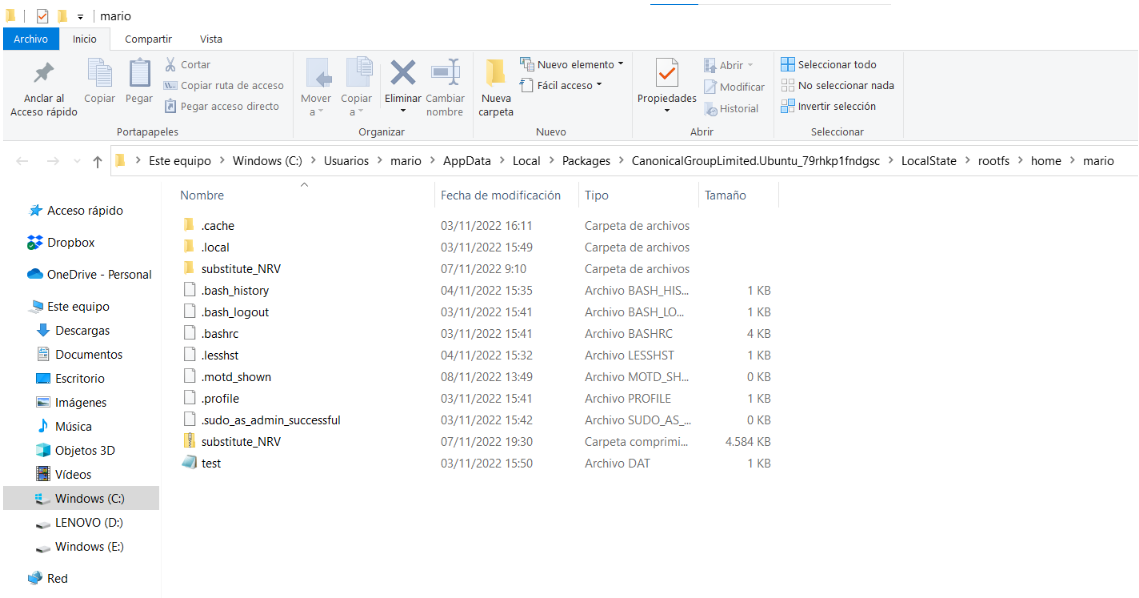
No releases published

Packages

No packages published

Languages

After download we will move the substitute_NRV.zip file to the Ubuntu home folder indicated before



Este equipo > Windows (C:) > Usuarios > mario > AppData > Local > Packages > CanonicalGroupLimited.Ubuntu_79rhkp1fndgsc > LocalState > rootfs > home > mario

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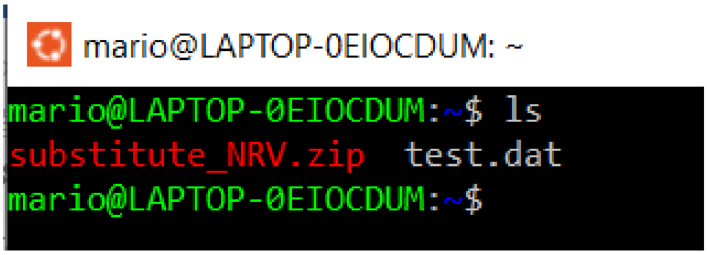
.bash_logout	03/11/2022 15:41	Archivo BASH_LO...	1 KB
.bashrc	03/11/2022 15:41	Archivo BASHRC	4 KB
.lesshst	04/11/2022 15:32	Archivo LESSHST	1 KB
.motd_shown	08/11/2022 13:49	Archivo MOTD_SH...	0 KB
.profile	03/11/2022 15:41	Archivo PROFILE	1 KB
.sudo_as_admin_successful	03/11/2022 15:42	Archivo SUDO_AS_...	0 KB
substitute_NRV	07/11/2022 19:30	Carpeta comprimi...	4.584 KB
test	03/11/2022 15:50	Archivo DAT	1 KB

After moving the file to this folder run again the Ubuntu program. The program only reads this folder at its start. Therefore, any files added from Windows while the Ubuntu program is running will not be detected.

After start, the Ubuntu application loads its home folder. In order to see its contents we run the command

Ls



```
mario@LAPTOP-0EIOCDUM: ~
mario@LAPTOP-0EIOCDUM:~$ ls
substitute_NRV.zip  test.dat
mario@LAPTOP-0EIOCDUM:~$
```

We should see the substitute_NRV.zip file. In order to extract its contents first we have to change the permissions on this file by running

chmod 777 substitute_NRV.zip

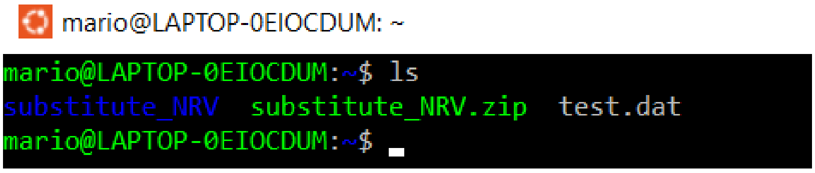
A helpful tip when typing: When filling a name, we can press the Tab key and the terminal will autofill the name of the file. Now we can unzip by running

unzip substitute_NRV.zip

After a series of messages, we can run

ls

again and we will see a new blue element substitute_NRV.

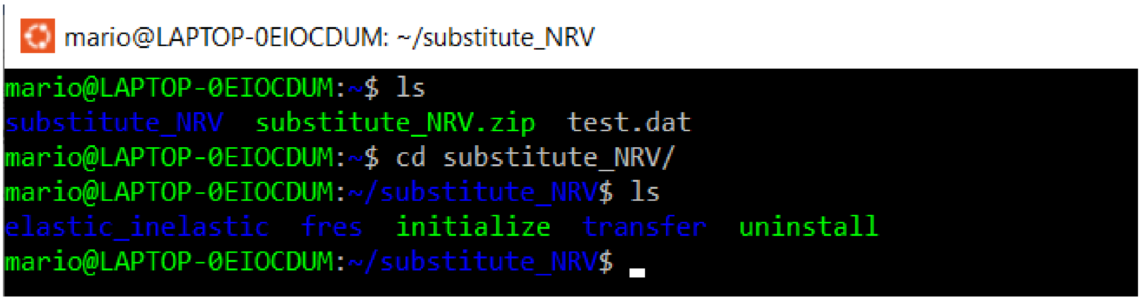


```
mario@LAPTOP-0EIOCDUM: ~
mario@LAPTOP-0EIOCDUM:~$ ls
substitute_NRV  substitute_NRV.zip  test.dat
mario@LAPTOP-0EIOCDUM:~$
```

This is a folder. We can go inside the folder with the cd command:

cd substitute_NRV

By using ls again we see it has some other files and folders inside



```
mario@LAPTOP-0EIOCDUM: ~/substitute_NRV
mario@LAPTOP-0EIOCDUM:~$ ls
substitute_NRV  substitute_NRV.zip  test.dat
mario@LAPTOP-0EIOCDUM:~$ cd substitute_NRV/
mario@LAPTOP-0EIOCDUM:~/substitute_NRV$ ls
elastic_inelastic  fres  initialize  transfer  uninstall
mario@LAPTOP-0EIOCDUM:~/substitute_NRV$
```

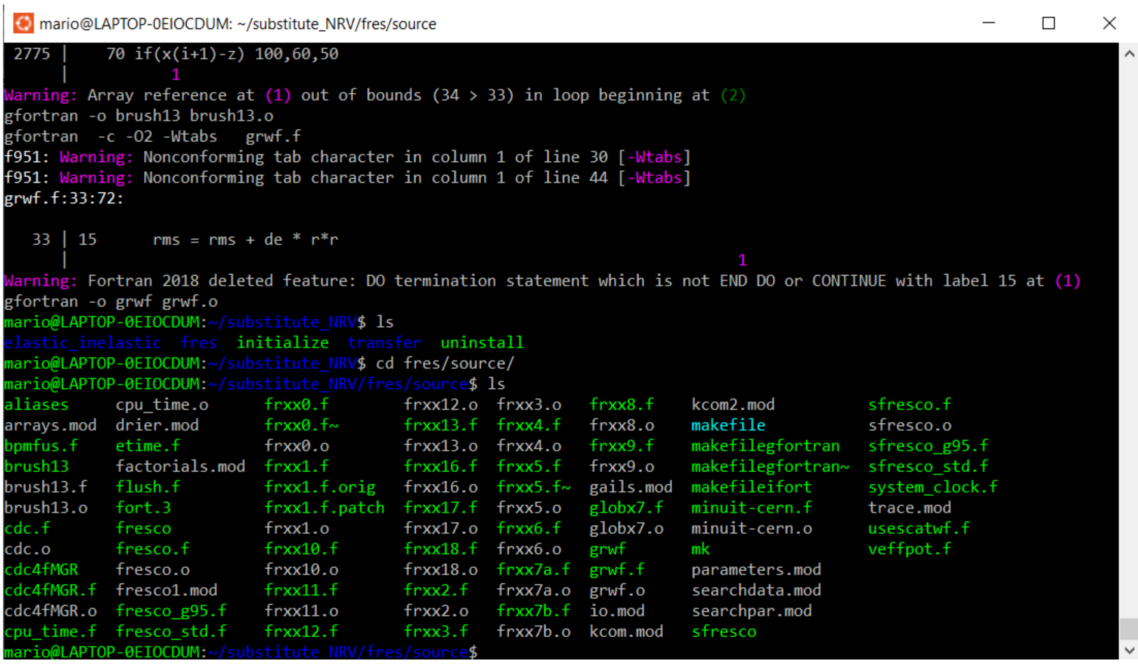
Now we must run the initialize program. In order to run a program we must type its name with ./ in front of it

./initialize

After some time and several messages the installation is complete. In order to check it we can move to the fres/source folder

cd fres/source

ls



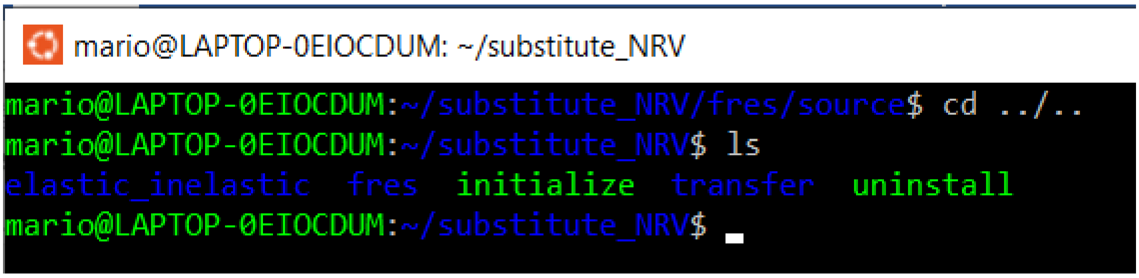
```
 2775 |    70 if(x(i+1)-z) 100,60,50
      |           1
Warning: Array reference at (1) out of bounds (34 > 33) in loop beginning at (2)
gfortran -o brush13 brush13.o
gfortran  -c -O2 -Wtabs   grwf.f
f951: Warning: Nonconforming tab character in column 1 of line 30 [-Wtabs]
f951: Warning: Nonconforming tab character in column 1 of line 44 [-Wtabs]
grwf.f:33:72:

   33 | 15      rms = rms + de * r*r
      |                                                                        1
Warning: Fortran 2018 deleted feature: DO termination statement which is not END DO or CONTINUE with label 15 at (1)
gfortran -o grwf grwf.o
mario@LAPTOP-0EIOCDUM:~/substitute_NRV$ ls
elastic_inelastic  fres  initialize  transfer  uninstall
mario@LAPTOP-0EIOCDUM:~/substitute_NRV$ cd fres/source/
mario@LAPTOP-0EIOCDUM:~/substitute_NRV/fres/source$ ls
aliases     cpu_time.o      frxx0.f        frxx12.o  frxx3.o   frxx8.f    kcom2.mod          sfresco.f
arrays.mod  drier.mod       frxx0.f~       frxx13.f  frxx4.f   frxx8.o    makefile           sfresco.o
bpmfus.f    etime.f         frxx0.o        frxx13.o  frxx4.o   frxx9.f    makefilegfortran   sfresco_g95.f
brush13     factorials.mod  frxx1.f        frxx16.f  frxx5.f   frxx9.o    makefilegfortran~  sfresco_std.f
brush13.f   flush.f         frxx1.f.orig   frxx16.o  frxx5.f~  gails.mod  makefileifort      system_clock.f
brush13.o   fort.3          frxx1.f.patch  frxx17.f  frxx5.o   globx7.f   minuit-cern.f      trace.mod
cdc.f       fresco          frxx1.o        frxx17.o  frxx6.f   globx7.o   minuit-cern.o      usescatwf.f
cdc.o       fresco.f        frxx10.f       frxx18.f  frxx6.o   grwf       mk                 veffpot.f
cdc4fMGR    fresco.o        frxx10.o       frxx18.o  frxx7a.f  grwf.f     parameters.mod
cdc4fMGR.f  fresco1.mod     frxx11.f       frxx2.f   frxx7a.o  grwf.o     searchdata.mod
cdc4fMGR.o  fresco_g95.f    frxx11.o       frxx2.o   frxx7b.f  io.mod     searchpar.mod
cpu_time.f  fresco_std.f    frxx12.f       frxx3.f   frxx7b.o  kcom.mod   sfresco
mario@LAPTOP-0EIOCDUM:~/substitute_NRV/fres/source$
```

If we see the file fresco in it the installation has been successful. We can go back to the substitute_NRV folder by using the command

cd ..

which goes to the parent folder. Using it twice or typing cd ../.. we will return to the substitute_NRV folder, as can be seen by the input prompt

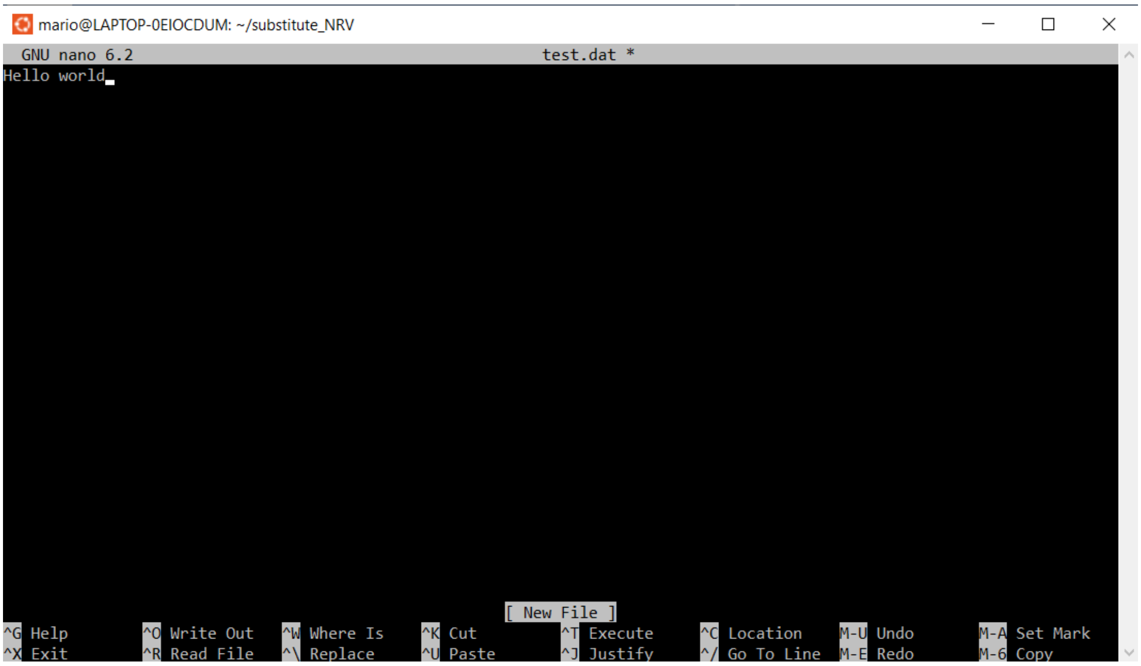


```
mario@LAPTOP-0EIOCDUM:~/substitute_NRV/fres/source$ cd ../..
mario@LAPTOP-0EIOCDUM:~/substitute_NRV$ ls
elastic_inelastic  fres  initialize  transfer  uninstall
mario@LAPTOP-0EIOCDUM:~/substitute_NRV$ _
```

Finally we will see how to create and modify data files and how to open them with Windows. The program nano is a moderately sophisticated text editor program included in Linux distributions. We will create a test file with it by typing

nano test.dat

This will open a nano window where we can type some message, like “Hello world”

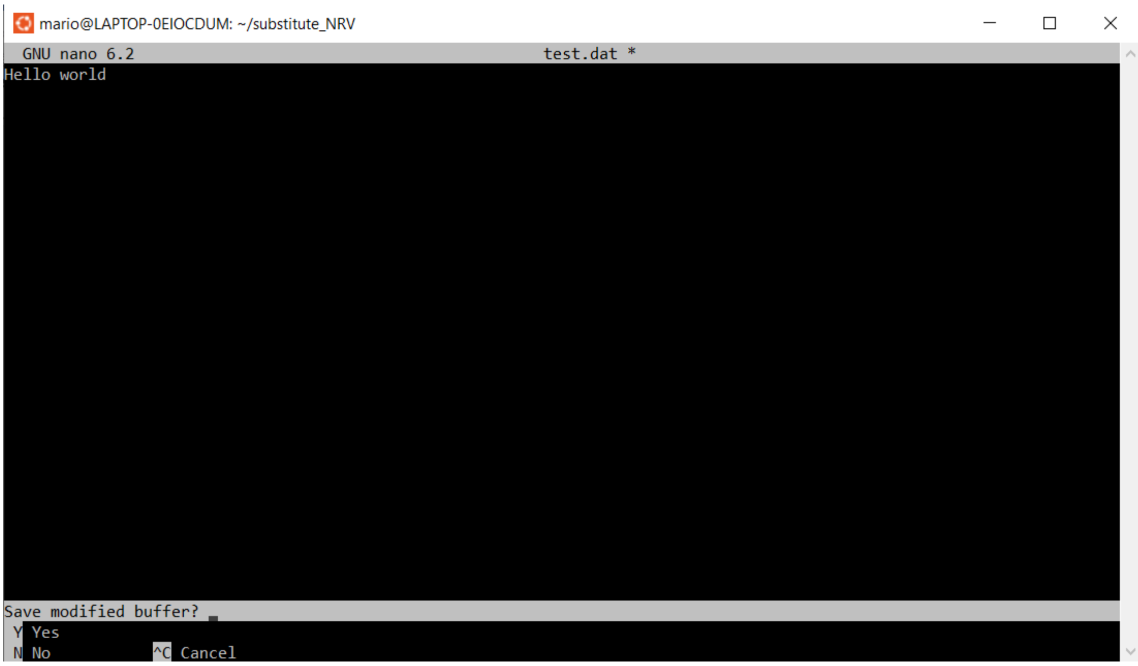


```
  GNU nano 6.2                                    test.dat *
Hello world_




                                            [ New File ]
^G Help         ^O Write Out    ^W Where Is     ^K Cut          ^T Execute      ^C Location     M-U Undo        M-A Set Mark
^X Exit         ^R Read File    ^\ Replace      ^U Paste        ^J Justify      ^/ Go To Line   M-E Redo        M-6 Copy
```

Then we will close nano with Ctrl+X



```
  GNU nano 6.2                                    test.dat *
Hello world




Save modified buffer? _
 Y Yes
 N No           ^C Cancel
```

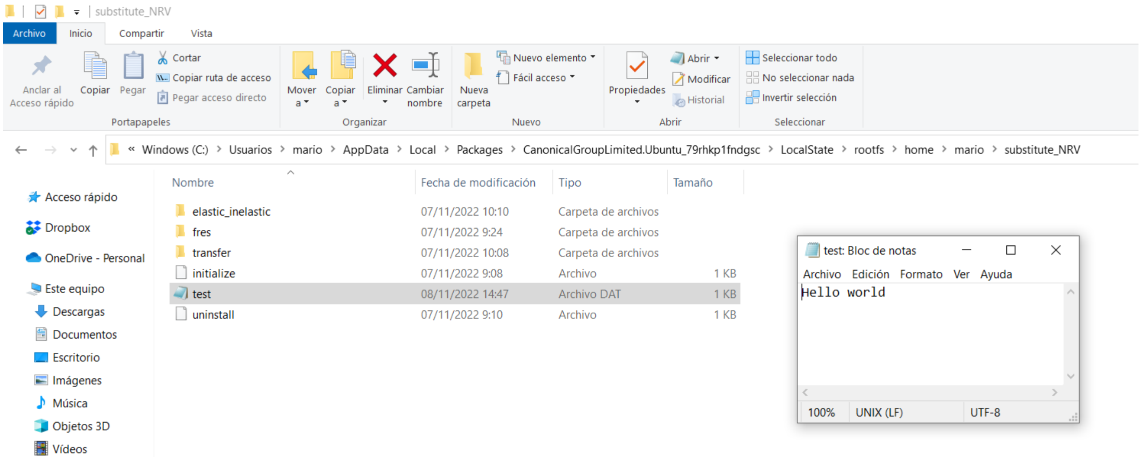
It will ask us if we want to save the file. We confirm by typing Y. We can modify the name of the file now, but we will leave it as by pressing the Enter key.

We can use

nano test.dat

again to see our written text which has now been saved.

If back in Windows we look at the Ubuntu home folder we can go to the substitute_NRV folder to find our test file. If we open it with the notepad (we may have to tell windows to use the notepad) we will be able to see our text.



Nombre	Fecha de modificación	Tipo	Tamaño
elastic_inelastic	07/11/2022 10:10	Carpeta de archivos	
fres	07/11/2022 9:24	Carpeta de archivos	
transfer	07/11/2022 10:08	Carpeta de archivos	
initialize	07/11/2022 9:08	Archivo	1 KB
test	08/11/2022 14:47	Archivo DAT	1 KB
uninstall	07/11/2022 9:10	Archivo	1 KB

```
Hello world
```

In this way we can access the files generated in the Ubuntu SO to treat them with Windows programs. The files can be copied to a Windows folder that is more convenient to use. Remember that the changes performed in Windows may not be well transferred to Ubuntu so it is better to modify the input files through the Ubuntu terminal.

Now, we will remove the test file by typing

rm test.dat

Be careful when removing files, as they cannot be recovered and you can lose files essential for the course, although they can be downloaded back from the website.