

## Geant4 Virtual Machine

[geant4-dna.org](http://geant4-dna.org)

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Geant4-DNA tutorial  
Princess Srisavangavadhana Faculty of Medicine,  
Bangkok, Thailand  
18-20/03/2026

**Geant4 version 11.4.0**  
**Released in December 2025**

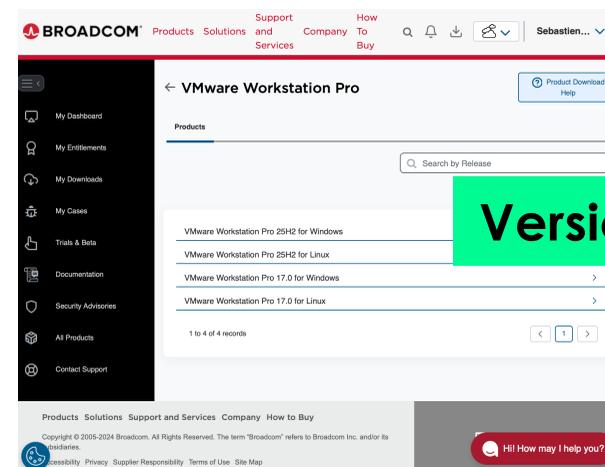
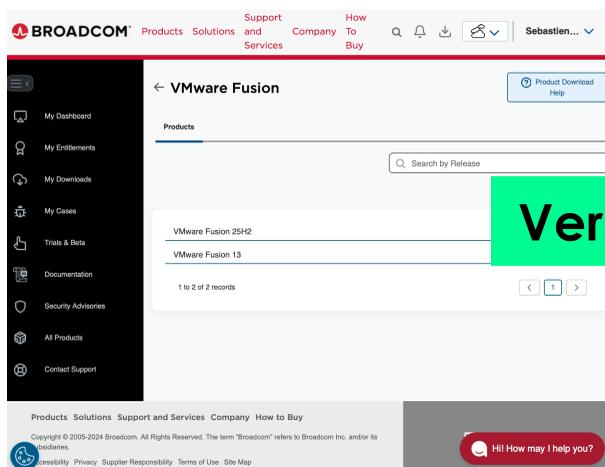
# Introduction

- We are providing since 2004 a **Geant4 Virtual Machine** (VM) for Geant4 users, which emulates a **AlmaLinux 9 machine**
  - Geant4 and many other software are already installed
  - **Regularly updated** with Geant4 releases (major, minor, patches, BETA)
  - Linux version: see CERN's policy: <https://linux.web.cern.ch/which/>
- Many **advantages**
  - No Geant4 installation needed
  - Accessible fully through download
  - Fully free
  - Can run with
    - **VMware Workstation** for **Windows & Linux**
    - **VMware Fusion** for **macOS**
- We use it regularly for Geant4 **tutorials**
  - All our hands-ons will be demonstrated on this virtual machine
  - Alternatively, advanced users may install Geant4 themselves following the **Geant4 Installation guide** <https://geant4-userdoc.web.cern.ch/UsersGuides/InstallationGuide/html/index.html>
  - We also maintain a special installation page for **macOS** users <https://geant4-dna.in2p3.fr/styled-6/styled-12/index.html>

# Step-by-step installation

# Step 1: install VMware Fusion or Workstation

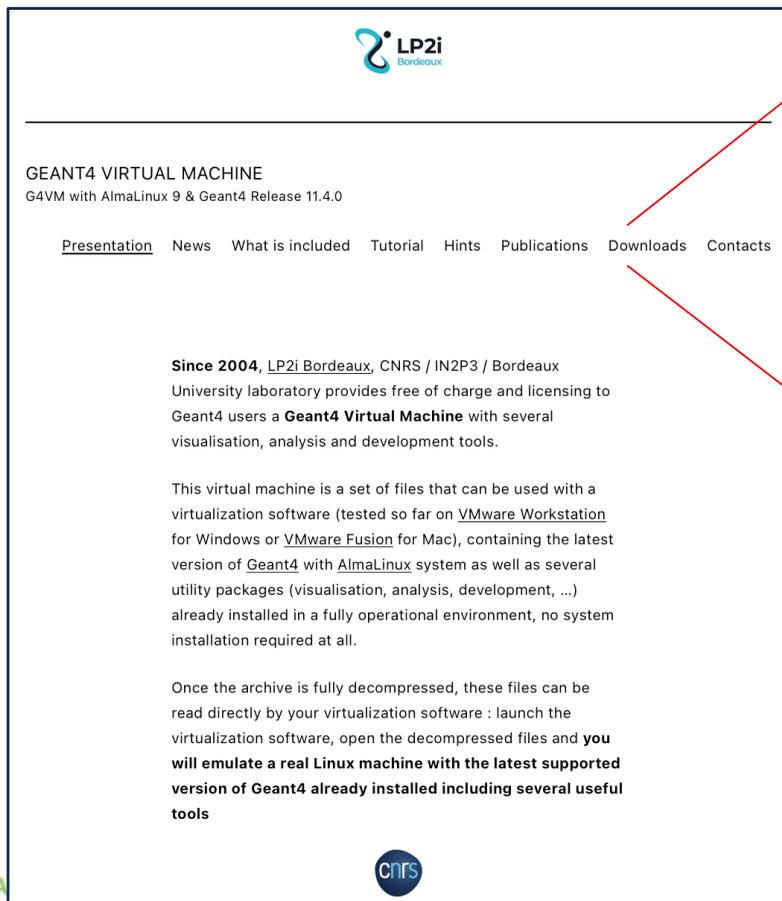
- Download virtualization software from <https://www.vmware.com>
  - **Products** → **SEE DESKTOP HYPERVISORS** → **DOWNLOAD NOW**
    - **Fusion** is for **macOS**, **Workstation** is for **Windows & Linux**
  - Redirected to Broadcom : **register...** (First Name, Last Name, E-mail, Institution...)
  - Go to **My Downloads** (left hand side menu)
  - Click on **Free Software Downloads available HERE**
  - Search **Fusion** for **macOS** or **Workstation Pro** for **Windows or Linux**
  - Select **VMware Fusion 25H2u1** for **macOS** or **VMware Workstation Pro 25H2u1** for **Windows or Linux**
  - Download and install
    - Even if you already have an existing working version of WMware (it will be upgraded automatically)



Chat if needed (after registration)

# Step 2: download the virtual machine

- Go to <https://geant4.lp2ib.in2p3.fr>
  - Go to **Downloads** section
  - Select the virtual machine you need
    - **Geant4 11.4.0**
    - A few 20 Go to download...
  - You may also check the [README](#) file



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GEANT4 VIRTUAL MACHINE  
G4VM with AlmaLinux 9 & Geant4 Release 11.4.0

[Presentation](#) [News](#) [What is included](#) [Tutorial](#) [Hints](#) [Publications](#) [Downloads](#) [Contacts](#)

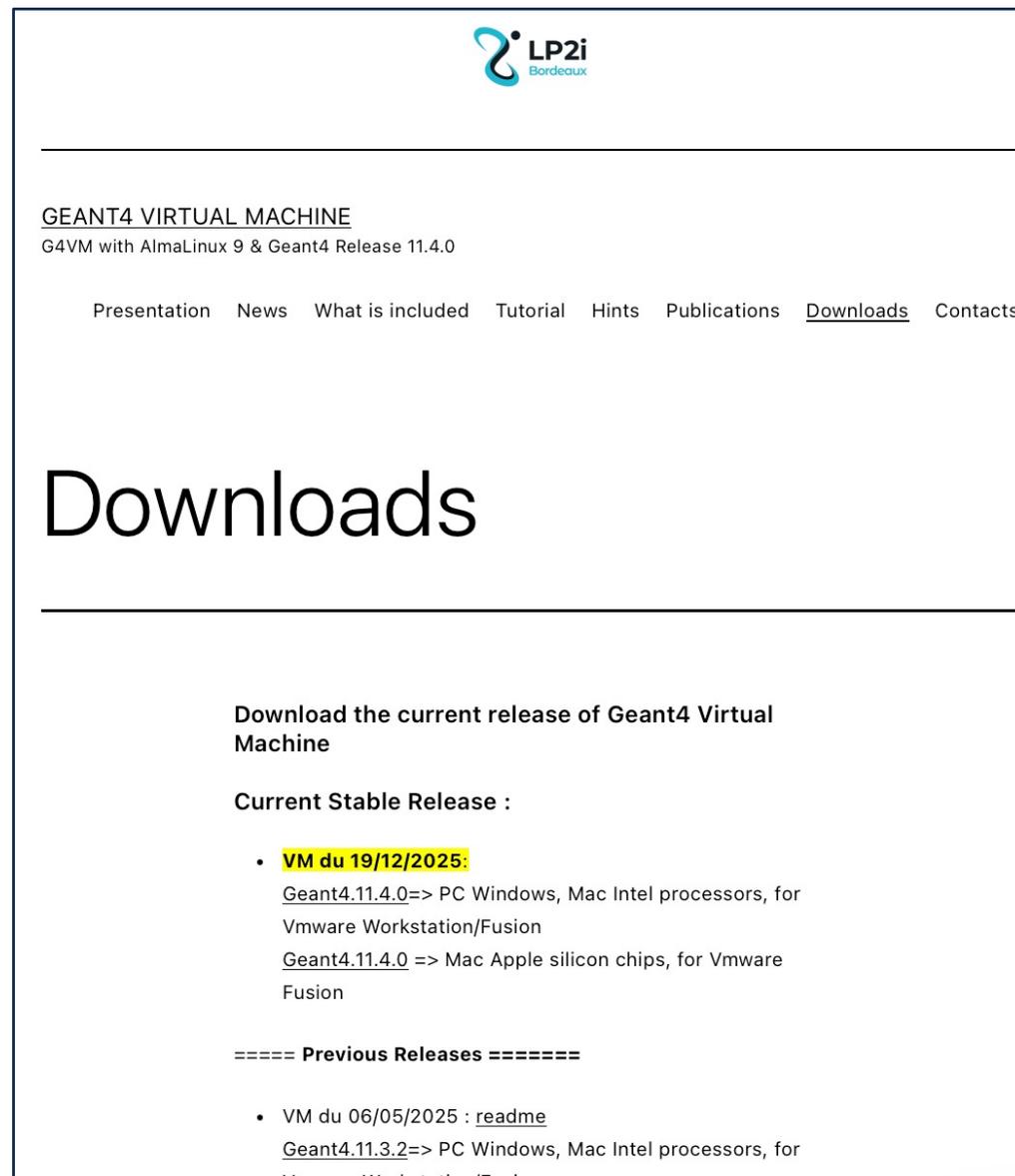
Since 2004, LP2i Bordeaux, CNRS / IN2P3 / Bordeaux University laboratory provides free of charge and licensing to Geant4 users a **Geant4 Virtual Machine** with several visualisation, analysis and development tools.

This virtual machine is a set of files that can be used with a virtualization software (tested so far on [VMware Workstation](#) for Windows or [VMware Fusion](#) for Mac), containing the latest version of [Geant4](#) with [AlmaLinux](#) system as well as several utility packages (visualisation, analysis, development, ...) already installed in a fully operational environment, no system installation required at all.

Once the archive is fully decompressed, these files can be read directly by your virtualization software : launch the virtualization software, open the decompressed files and **you will emulate a real Linux machine with the latest supported version of Geant4 already installed including several useful tools**

GEANT4 DNA

cnrs



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GEANT4 VIRTUAL MACHINE  
G4VM with AlmaLinux 9 & Geant4 Release 11.4.0

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# Downloads

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**Download the current release of Geant4 Virtual Machine**

**Current Stable Release :**

- **VM du 19/12/2025:**  
[Geant4.11.4.0](#)=> PC Windows, Mac Intel processors, for Vmware Workstation/Fusion  
[Geant4.11.4.0](#) => Mac Apple silicon chips, for Vmware Fusion

===== **Previous Releases** =====

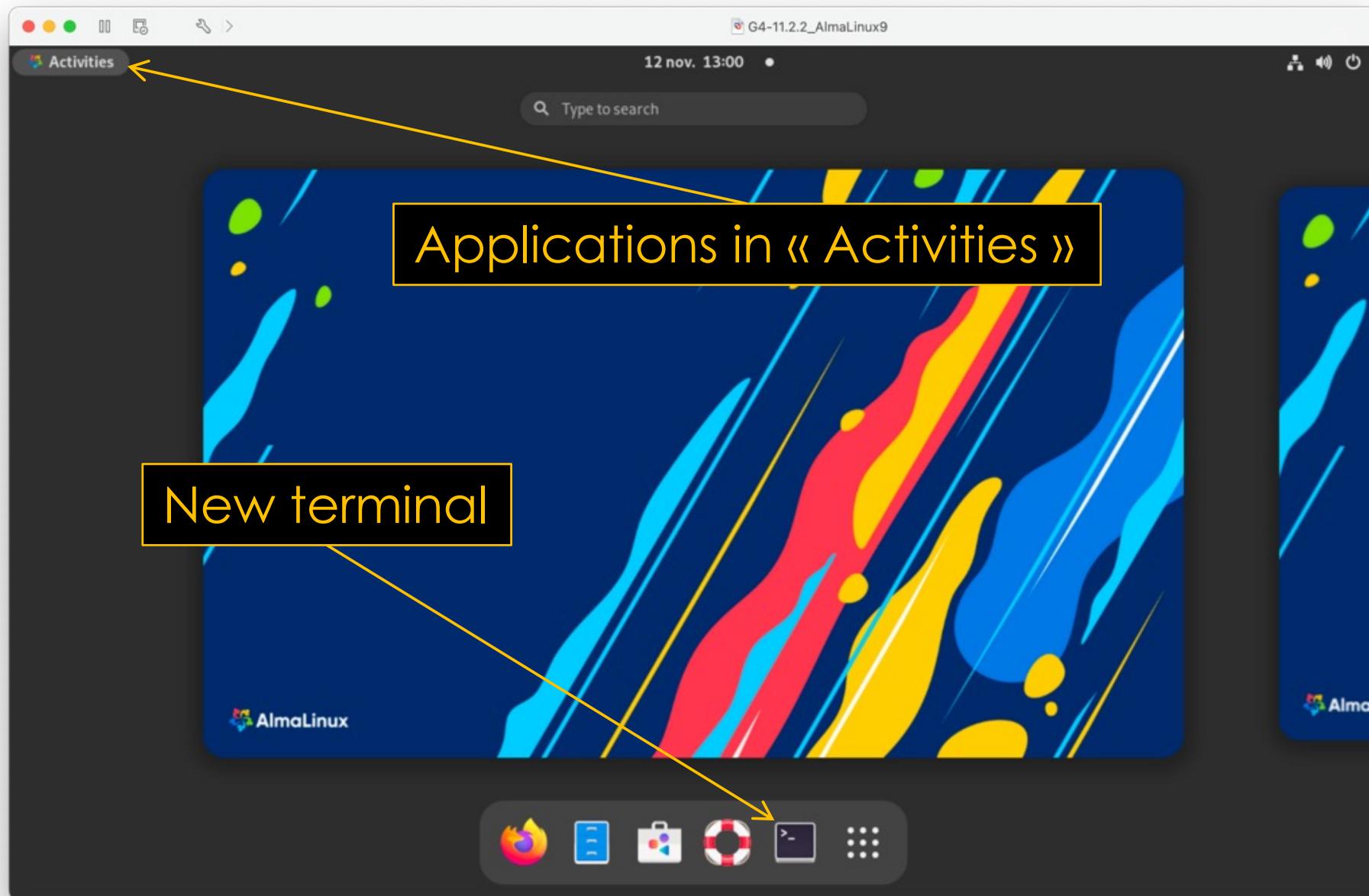
- VM du 06/05/2025 : [readme](#)  
[Geant4.11.3.2](#)=> PC Windows, Mac Intel processors, for Vmware Workstation/Fusion

## Step 3: uncompress the virtual machine

- Start VMware Fusion or VMware Workstation Pro
- Uncompress the downloaded archive and open the **\*vmwarevm** file (Mac) or the **\*.vmx** file (Windows)
- The virtual machine will start
- You may **customize** the VM properties according to your Mac/PC
  - e.g., amount of memory to allocate, number of processors...
- **Important**
  - Read carefully the following [README](#) file containing information about requirements and how to proceed.
  - If asked, declare that the virtual machine **has been copied** (and not moved).
  - On **Windows**, you may uncompress your archive using the [7-Zip](#) application, freely available.
  - **Windows** users may need to check that virtualization has been activated in the BIOS.
  - The total compressed file size is about 20 Go and reaches 30 Go when fully decompressed.

# Your virtual machine

Your local account *username* and *password* are  
local1  
local1



# Hints on virtual machine usage

## Some hints (1/5)

- Depending on your country, you may need to change your **keyboard settings**. By default, a **french (FR) or american (US) keyboard** is configured.
  - You can switch from FR to US on the top right corner of the main window (Settings → Keyboard)



- The **default account username** is `local1` and it has the **same password**.
- You can configure entirely by your own your Virtual Linux Machine as root. The **root password** is mentioned in the [README](#) file.
- On macOS, you may switch from VM to macOS using control & command key combination.

## Some hints (2/5)

- You can increase the **memory size** of your Virtual Machine, especially if your PC has a large memory size available; for example, simply go to the Virtual Machine menu, select Virtual Machine Settings, Hardware and select the memory size you need.
- If your machine is equipped with **more than two processors**, you may choose the number of processors in the Virtual Machine menu, select Virtual Machine Settings, Hardware.
- You may **create a new disk** in your virtual machine in case you need more space for your data. All instructions are given in the [README](#) file.
- Your **personal environment** is defined in the `/home/local1/.cshrc` file.
- You may change **user environment variables** by adding a `.ucshrc` file also located in the directory `/home/local1`

## Some hints (3/5)

- You may need to define an **exchange directory** between your host (Windows for example) and the Linux virtual machine containing Geant4.
- To do that, in the VM menu of the VMware software, do as follows:
  - Go to the Player menu
  - Select **Virtual Machine Settings**/Options/Shared Folders
  - Make sure the « Always enabled » option is selected (if available)
  - Select Add to chose a host path for a folder and give it a name, like « shared »
  - Click Finish, then you should see the name of this directory appear in the « Host Path »
  - Click OK
- Under your Linux session, your **exchange directory** is located at `/mnt/hgfs/name_of_exchange_directory`
  - You can test : `ls /mnt/hgfs/name_of_exchange_directory`
- If this does not work, you may:
  - Deactivate and reactivate sharing in Options / Settings / Advanced / Shared folders
  - Or need to reinstall VMware tools from the Virtual Machine menu...

## Some hints (4/5)

- Make sure to always use the **latest version** of the virtualization software.
- Under Windows, you may encounter problems if the disks (internal & external hard drives, USB keys...) where you uncompress your files have been formatted in the FAT32 format. **Use NTFS formatted disks only** (same remark for USB keys).
- If you **do not have network access** on your virtual machine or the `/mnt/hgfs` folder is not present, you probably need to reinstall VMware tools.

## Some hints (5/5)

### ■ Environment variables

- **\$G4INSTALL**
  - **\$G4COMP**: Library directory for Geant4 compilation  
`/usr/local/geant4.version/lib64/Geant4`
  - **\$G4SRC**: Geant4 sources
  - **\$G4EXAMPLES**: all examples
  - **\$G4UI\_USE\_TCSH**: User Interface (set to 1)
  - **\$G4UI\_USE\_QT**: Qt interface (set to 1)
  - **\$G4VIS\_USE**: Visualization (set to 1)
  - **\$G4VIS\_USE\_OPENGLX**: Visualization using OpenGL (set to 1)
- 
- Most of the environment variables are defined in the environment module files:  
`/usr/share/Modules/modulefiles/geant4/version`
  - The software is installed in the `/usr/local` directory, with RPM packages of the AlmaLinux distribution.

# Testing of your VM

## Let's check that the VM works fine...

- Type the following sequence in a **Terminal**

```
cd
cp -R $G4EXAMPLES/basic/B3 .
cd B3
mkdir build
cd build
cmake ../B3a
make
./exampleB3a
```

- The Qt interface will show up, then enter in « Session » window the command:

```
/control/execute run1.mac
```

## Useful software provided with the VM (version dep.)

- Operating System [AlmaLinux 9](#)
- [Geant4](#) with all sets of data files
- [Boost](#)
- [CLHEP](#)
- [Firefox](#)
- [GDB](#)
- [Geany](#)
- [gedit](#) ★
- [Grace](#)
- [Gnuplot](#)
- [ImageMagick](#)
- [Jupyter](#)
- [LibreOffice](#)
- [Python3](#) with [Jupyter](#), [Matplotlib](#), [NumPy](#), [SciPy](#) and [Sphinx](#)
- [Qt6](#)
- [ROOT](#) ★
- [Eclipse IDE](#)
- [Tex Live](#)
- [Thunderbird](#)
- [Valgrind](#)
- [XercesC](#)
- [CMake](#), [make](#) ★

# Useful Linux commands

# Linux (1): navigation in directories, env. variables

- The default shell is `tcsh`
- `pwd` : display current directory
- `cd directory` : go into *directory*
- `cd` : go home directory (~)
- `cd ..` : go to parent directory
- `ls` : list files
- `ls -a` : list files, including hidden files
  
- `echo $VAR` : display environment variable `VAR`
- `setenv VAR value` : set `value` of environment variable `VAR` (tcsh shell)
  
- Add `&` after command name to keep control

## Linux (2): move, copy, create, delete...

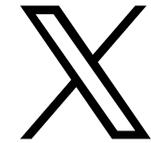
- `mv source target` : move and / or rename a file
- `cp source target` : copy a file
- `cp -R source target` : copy a directory
- `mkdir directory` : create a directory
- `rmdir directory` : remove an **empty** directory
- `du -ks directory` : give the size of a directory (in ko)
- `rm file` : delete a file
- `rm -f file` : deleted a write-protected file
- `rm -R directory` : delete a directory
- Tip: To copy / paste within the macOS VM
  - select your text with pad or mouse, then go to paste location, press '**command**' key, and click pad or mouse simultaneously

# Thank you for your attention

## Questions?

If you use the VM, please kindly cite

Int. J. Model. Simul. Sci. Comput. 1 (2010) 157–178 ([link](#))



@Geant4VM





**In case of troubles...**

# 1) If **sharing of directory** is not working (Workstation Pro, version 25H2u1)

1. Define a shared folder from the **VM Settings** menu
    - E.g., **Desktop**
  2. Open a terminal in the VM and type:
    - `vmhgfs-fuse /home/local1/Public`
  3. Then, to copy in your VM home a `myFile.txt` file from **Desktop**, do:
    - `cd`
    - `cp Public/Desktop/myFile.txt .`
- Note #1: do this after each shutdown of the VM
  - Note #2: Fusion does not have this issue

## Use case : the **medical\_linac\_handson.tar.gz** hands-on

- Download the file onto your **Windows machine**, on the **Desktop**
- Then, go to the **VM machine**
  - We assure that **Desktop** is your **shared** directory
- Open a terminal and type
  - `vmhgfs-fuse /home/local1/Public`
  - `cd`
  - `mkdir G4Work`
  - `cp Public/Desktop/ medical_linac_handson.tar.gz .`
  - `cd G4Work`
  - `tar -zxvf medical_linac_handson.tar.gz`
  - `cd medical_linac_handson`
  - ...

## 2) If **Internet** is not working (Fusion, version 25H2)

- In a terminal, type
  - **nmcli device**
    - Look at the device name which is disconnected (e.g., **enp2s0**)
  - **nmcli connection show**
    - Look at the device name that is connected to ethernet (e.g., **ens160**)
  - **sudo nmcli connection delete ens160**
    - Enter: local1
  - **sudo nmcli connection add type ethernet ifname enp2s0 con-name enp2s0 ipv4.method auto ipv6.method auto**
  - **nmcli connection up enp2s0**
- Try internet again (e.g., firefox)

```
g4vm:/local1 < 63 > nmcli device
DEVICE  TYPE      STATE          CONNECTION
lo      loopback  connected (externally) lo
enp2s0  ethernet  disconnected    --
```

This is your network device name.

```
g4vm:/local1 < 87 > nmcli connection up enp2s0
Error: unknown connection 'enp2s0'.
g4vm:/local1 < 88 > nmcli connection show
NAME    UUID                                TYPE      DEVICE
lo      a36a4b2f-f1ac-4dd4-8335-d15dfa929ac6 loopback  lo
ens160  7f871b38-1f33-39cb-bab8-4eda0a5ac240 ethernet  --
```

If you don't have the same device name here.

Please try following commands!

```
g4vm:/local1 < 100 > sudo nmcli connection delete ens160
Connection 'ens160' (7f871b38-1f33-39cb-bab8-4eda0a5ac240) successfully deleted.
g4vm:/local1 < 101 > sudo nmcli connection add type ethernet ifname enp2s0 con-name enp2s0 ipv4.method auto ipv6.method auto
Connection 'enp2s0' (0f5bb16d-2e3b-4cc9-b68e-67a7f23c8b21) successfully added.
g4vm:/local1 < 102 > nmcli connection up enp2s0
Connection successfully activated (D-Bus active path: /org/freedesktop/NetworkManager/ActiveConnection/3)
g4vm:/local1 < 103 >
g4vm:/local1 < 103 > ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=111 time=10.6 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=111 time=14.7 ms
```