

LIGHTNING INSTALLATION MANUAL

Lightning 0.8.5

11/07/2018

This user manual will explain the installation procedure of **Lightning** (<https://github.com/ptoribi/lightning>), the network simulator based on Docker containers. This document is intended to be a guide for the system administrator of your organization.

For information about how to use this program, please refer to the “*User Manual*”. For creating and configuring your own containers or scenarios repository, please take a look to the “*Professor manual*”.

Compatibility

Debian 9 x86_64 (compatibility with more OS will be checked in the nearly future).

Before the installation

Before installing Lightning please check that your OS counts with the following **dependencies**:

- **docker-ce** (Docker Community Edition) A complete guide for installing Docker can be found in the official documentation of the project: <https://docs.docker.com/>

On the left panel: **Get Docker** -> **Docker CE** -> **Linux** -> Select your Linux distro and follow the instructions.

- **utilities**: brctl (command line tool for ethernet bridges manipulation), xmllint (XML parser), evince (PDF viewer), git (version control software)

```
# apt-get install bridge-utils libxml2-utils evince git
```

- **other utilities** that may probably be already installed in your OS:

```
# apt-get install sudo bash x11-utils libc-bin coreutils  
iproute2 iptables mawk sed
```

Install the program

- Get the last version of the project

```
$ git clone https://github.com/ptoribi/lightning.git
```

- **Change default locations (Optional)**

In order to set the location where the application folder and the symbolic link to the main program will be installed, you can change inside the **install** file the following variables:

- **LIGHTNING_INSTALLATION_DIRECTORY**
- **SYMLINK_INSTALLATION_DIRECTORY**

```
# Please, feel free to modify the variable LIGHTNING_INSTALLATION_DIRECTORY accordingly
# to your system needs, but do NOT add the final slash ("/") at the end of the directory.
# A folder called "lightning" will be created inside this location in order to
# store the files and libraries needed by the program. The default value is /usr/local
LIGHTNING_INSTALLATION_DIRECTORY=/usr/local

# Please, feel free to modify the variable SYMLINK_INSTALLATION_DIRECTORY accordingly
# to your system needs, but do NOT add the final slash ("/") at the end of the directory.
# A symbolic link to the main binary (stored in LIGHTNING_INSTALLATION_DIRECTORY/lightning)
# will be created inside this location. Please ensure this location is included in the
# PATH variable of your operating system. The default value is /usr/local/bin
SYMLINK_INSTALLATION_DIRECTORY=/usr/local/bin
```

Please ensure before installing that those paths are included in your system's PATH variable. If you have no special needs the default values just work well.

- **Change default repositories (Optional)**

You can specify your own code, scenarios and Docker image repositories to be used by Lightning. This can be done by modifying the **variables.conf** file:

```
# Docker images repository
DOCKER_IMAGE_host="ptoribi/ptoribi:host"
DOCKER_IMAGE_router="ptoribi/ptoribi:router"

# Git repository for CODE
GIT_REPO="https://github.com/ptoribi/lightning.git"

# Git repository for SCENARIOS
GIT_REPO_SCENARIOS="https://github.com/ptoribi/lightning-scenarios.git"
```

Please agree these values with the professor that will use Lightning.

Alternatively, the file **variables.conf** can also be modified after the installation.

- **Install Lightning**

The installation script will copy all the necessary files to the operating system, and, in addition, will install the scenarios and Docker images indicated in the **variables.conf** file.

```
$ cd lightning
$ sudo ./install
```

```
Terminal
File Edit View Search Terminal Help
student@uc3m:~$ git clone https://github.com/ptoribi/lightning.git
Cloning into 'lightning'...
remote: Counting objects: 364, done.
remote: Compressing objects: 100% (67/67), done.
remote: Total 364 (delta 55), reused 65 (delta 27), pack-reused 269
Receiving objects: 100% (364/364), 823.65 KiB | 581.00 KiB/s, done.
Resolving deltas: 100% (207/207), done.
student@uc3m:~$ cd lightning
student@uc3m:~/lightning$ sudo ./install
Lightnig was properly installed
Cloning into '/usr/local/lightning/scenarios'...
remote: Counting objects: 54, done.
remote: Compressing objects: 100% (31/31), done.
remote: Total 54 (delta 29), reused 48 (delta 23), pack-reused 0
Unpacking objects: 100% (54/54), done.
Scenarios were properly installed
host: Pulling from ptoribi/lightning
Digest: sha256:8890f4d03f2ed85009b83640b1fe8d95e242577f99583d45a563cd50b47d5a90
Status: Image is up to date for ptoribi/lightning:host
router: Pulling from ptoribi/lightning
Digest: sha256:90f846debf178e2796f9f8bafcac3d5e268c69cade214954b2b7d6b0e1236838
Status: Image is up to date for ptoribi/lightning:router
student@uc3m:~/lightning$
```

After the installation

The user "root" should not execute Lightning directly, only regular users should. Regular users must execute Lightning with root privileges, this can be done by using **one** of these four different ways:

- Adding the specific user to the sudo group (warning!, that user will be allowed to execute all the programs in the system as root):

```
$ sudo usermod -a -G sudo USER_NAME
```

- Allowing that specific user to execute Lightning:

```
$ sudo bash -c "echo 'USER_NAME ALL=(ALL) NOPASSWD: $(dirname $(readlink -f $(which lightning)))/lightning' >> /etc/sudoers"
```

- Creating a new group and allowing all its members to execute Lightning, then adding the specific user to that group:

```
$ sudo groupadd GROUP_NAME
$ sudo bash -c "echo '%GROUP_NAME ALL=NOPASSWD: $(dirname $(readlink -f $(which lightning)))/lightning' >> /etc/sudoers"
$ sudo usermod -a -G GROUP_NAME USER_NAME
```

- **Allowing all the users in the system to execute Lightning:**

```
$ sudo bash -c "echo 'ALL ALL=(ALL) NOPASSWD: $(dirname $(readlink -f $(which lightning)))/lightning' >> /etc/sudoers"
```

Add new scenarios

There are two folders related to scenarios storage:

- **scenarios** → will be populated with the scenarios stored in the configured online repository (GIT_REPO_SCENARIOS variable in the `variables.conf` file).
- **scenarios-local** → this folder is intended for storing scenarios locally to the computer.

Both folders allow to create other one-level-depth folders inside them to classify the scenarios (for example, with the names of the academic courses).

Add new functions

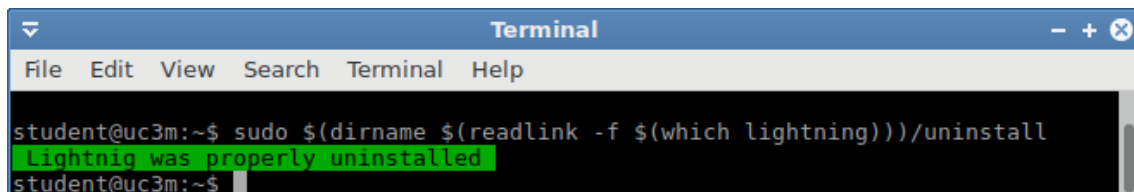
Apart from using the default functions (stored in the **functions** file), new functions can be defined in the **personalized_functions** file.

For the time being, when using a *XML document* for defining the network scenario Lightning only allows to use the default functions, for using functions created by the professors, they should define the scenario as a *direct execution file*.

Uninstall the program

You will be able to uninstall the program by executing:

```
$ sudo $(dirname $(readlink -f $(which lightning)))/uninstall
```

A screenshot of a terminal window titled "Terminal". The window has a menu bar with "File", "Edit", "View", "Search", "Terminal", and "Help". The terminal shows a user at a prompt "student@uc3m:~\$". The user enters the command "sudo \$(dirname \$(readlink -f \$(which lightning)))/uninstall". The output of the command is "Lightnig was properly uninstalled", which is highlighted in green. The prompt then changes to "student@uc3m:~\$".

```
student@uc3m:~$ sudo $(dirname $(readlink -f $(which lightning)))/uninstall
Lightnig was properly uninstalled
student@uc3m:~$
```

Please note that all the files related to Lightning will be removed from the system, including the **scenarios-local** folder and the **personalized_functions** file.

```
Terminal
File Edit View Search Terminal Help

student@uc3m:~$ lightning update
Cloning into '/tmp/lightning-tmp'...
remote: Counting objects: 364, done.
remote: Compressing objects: 100% (67/67), done.
remote: Total 364 (delta 55), reused 65 (delta 27), pack-reused 269
Receiving objects: 100% (364/364), 823.65 KiB | 546.00 KiB/s, done.
Resolving deltas: 100% (207/207), done.
Lightnig was properly uninstalled
Lightnig was properly installed
Cloning into '/usr/local/lightning/scenarios'...
remote: Counting objects: 54, done.
remote: Compressing objects: 100% (31/31), done.
remote: Total 54 (delta 29), reused 48 (delta 23), pack-reused 0
Unpacking objects: 100% (54/54), done.
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Digest: sha256:8890f4d03f2ed85009b83640b1fe8d95e242577f99583d45a563cd50b47d5a90
Status: Image is up to date for ptoribi/lightning:host
router: Pulling from ptoribi/lightning
Digest: sha256:90f846debf178e2796f9f8bafcac3d5e268c69cade214954b2b7d6b0e1236838
Status: Image is up to date for ptoribi/lightning:router
student@uc3m:~$
```