

Setting up the NS3- OpenDSS Co-simulation Demo under Linux

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This document describes the procedure for setting up the user's local Linux environment for: Executing the demo using the compiled application and, assembling the environment for modifying it directly from Linux.

Preliminary Steps for Linux

These were tested on Ubuntu 16.04.2 LTS:

1. Obtain GCC using apt-get for running the precompiled OpenDSS executable (command line interface)
2. Obtain GSL using apt-get

If using apt for installing packages, type the following commands from terminal:

```
sudo apt-get update
sudo apt-get install build-essential software-properties-common -y
sudo add-apt-repository ppa:ubuntu-toolchain-r/test -y
sudo apt-get update
sudo apt-get install gcc-snapshot -y
sudo apt-get update
sudo apt-get install gcc-6 g++-6 -y
sudo update-alternatives --install /usr/bin/gcc gcc /usr/bin/gcc-6 60 --slave /usr/bin/g++ g++ /usr/bin/g++-6
sudo apt-get install gcc-4.8 g++-4.8 -y
sudo update-alternatives --install /usr/bin/gcc gcc /usr/bin/gcc-4.8 60 --slave /usr/bin/g++ g++ /usr/bin/g++-4.8
```

When completed, you must change to the gcc you want to work with by default. Type in your terminal:

```
sudo update-alternatives --config gcc
```

To verify if it worked. Just type in your terminal

```
gcc -v
```

This procedure was taken from:

<https://gist.github.com/application2000/73fd6f4bf1be6600a2cf9f56315a2d91>

The next step is to prepare the platform for executing the NI LabVIEW run-time. This demo was developed using NI LabVIEW 2010, which means that it can be edited with later versions. The program was developed using the actor model as a framework, however, NI LabVIEW 2010 does not has the actor

framework included. For this reason the user will notice that the actors and the actor's components are implemented explicitly.

For installing the NI LabVIEW Run-Time for Linux do the following:

1. Download the NI LabVIEW 2010 Run-Time from the National Instruments website:
<http://www.ni.com/download/labview-run-time-engine-2010-sp1/2297/en/>
2. If the aim is to run the demo in a 64 bit Linux with a NI LabVIEW 32 bit Run-Time, it is necessary to install some additional Linux packages previously. If your Run-Time package is 64 bit, please skip this step.

```

sudo -i
apt-get install lib32z1 lib32ncurses5 lib32bz2-1.0 lib32stdc++6
apt-get install libxinerama1:i386 libgl1-mesa-glx:i386
apt-get install xfonts-75dpi xfonts-100dpi
cp /usr/lib32/libbz2.so.1 /usr/lib
reboot

```
3. The Run-Time comes in .rpm format, for this reason it is necessary to compile it into a .deb for being installed in your local Ubuntu installation. To do it you can use fakeroot, for example, if you have a .rpm LabVIEW file called "labview61-rte-6.1-1.i386.rpm" the conversion procedure is as follows:
 - 3.1. Install fakeroot (if not installed): `sudo apt-get install alien fakeroot`
 - 3.2. Convert the .rpm file: `fakeroot alien labview61-rte-6.1-1.i386.rpm`
 - 3.3. Install the new .deb file: `sudo dpkg -i labview61-rte_6.1-2_i386.deb`

There is another feature related with the operating system version, if the Linux version is 64 Bit and the downloaded LabVIEW Run-Time is 32 bit, it will be necessary to perform the conversion process in a 32 bit Linux. The new .deb file can be installed in Linux 32/64 bit versions.

This steps should enable your machine for running the demo. For details please check the following links:

<https://wiki.ubuntu.com/LabVIEW>
<http://digital.ni.com/public.nsf/allkb/A4FDECBA6BD83E2A86257CE8005A22C3>
<https://www.howtogeek.com/howto/ubuntu/install-an-rpm-package-on-ubuntu-linux/>

Installing NS3

NS3 requires additional installation steps, the demo is set for working with the version 3.26. In the NS3 website there is a list of prerequisites for compiling and executing the program (<https://www.nsnam.org/wiki/Installation#Ubuntu.2FDebian>). Follow the instructions for installing these prerequisites but do not follow the later instructions on the installation.

For the NS3 installation download NS3 version 3.26 from the NS3 website (<https://www.nsnam.org/ns-3-26/>). Then, decompress the file content in a folder called ns3. Inside of this folder another folder will be created containing all the NS3 program files, the name of the folder must be ns-allinone-3.26. As a result, the NS3 program files must be located at the path `home/user/ns3/ns-allinone-3.26`.

For the installation procedure follow the instructions contained at the following YouTube video: <https://www.youtube.com/watch?v=SckgZkBg-Oc>. There are some instructions at the NS3 website but this instructions are out of date. Also check that the NS3 simulator is working correctly.

Installing the demo program

The demo program and the source code is available at github and can be cloned using the following link:

https://github.com/davismont/OpenDSS_NS3_CoSim.git

Once the source code has been downloaded into the local Linux installation, copy the file `myscript.cc` located at the folder *NS3_File* into the folder *scratch* inside the NS3 installation. This is the simulation script for the communication network used in this demo. After this, go to the NS3 installation folder (Downloads/ns3/ns-allinone-3.26) and execute `waf` (`./waf`) from terminal to recompile the file recently added.

Once this is done, the demo program is ready to be executed. Just double click on the program called *CoSim_Demo* located at the base folder of the demo.

Also check the Video at the videos folder, which shows the execution of the demo.