

setup_cuda_environment_ubuntu_18.04

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1 CUDA libraries setup on Ubuntu 18.04 LTS

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2 Introduction

Twistcode® have decided to benchmark its supercomputer cluster using [HPCG benchmark](#) compare to [Linpack benchmark](#) due to having the latest hardware at the time of writing.

This note is to capture the setup that have been done for the benchmark.

3 Objective

Since there is no supercomputer in Malaysia that is currently (or previously) benchmarked against [Top500](#) or [HPCG](#), we have decided to do so.

4 Methodology

Since we have a lot of Nvidia GPU [Titan V](#), which is [volta-based](#) architecture, we need to use CUDA library that utilize its capabilities.

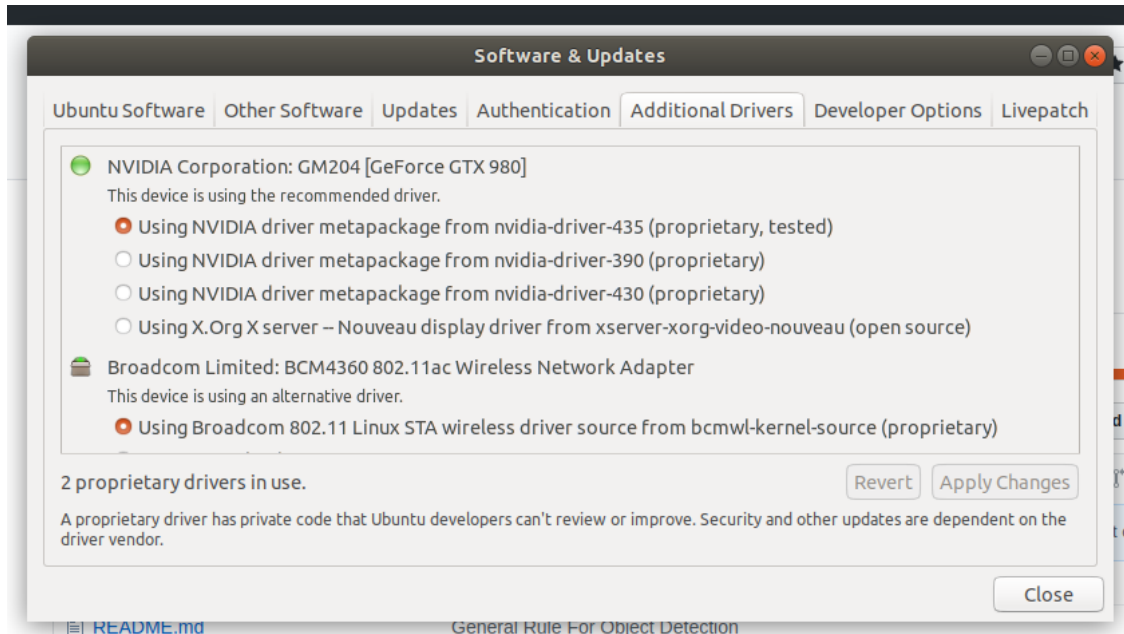
The latest CUDA is version [10.1](#), OpenMPI is version [4.0.1](#). Unfortunately, [hpcg binary](#) is only available for CUDA 9.0

5 Setting up Nvidia GPU Driver

Before venture any further, our ubuntu need to have proper graphics driver before any NVIDIA libraries can be utilize.

5.1 Method 1

From your ubuntu, go to **software & updates** and open **additional drivers** tab like figure 1. Then, from the radio button choose the one that have **proprietary, tested** and click **Apply Changes**. Once the installation is complete, please reboot your workstation.



OR alternatively, you can type `sudo apt install nvidia-driver-435` at the ubuntu command-line interface. Once finish, please reboot your workstation.

5.2 Method 2

- 1) Download suitable driver (for Linux 64-bit) from [Nvidia website](#)
- 2) run the following in commandline:

```
sudo chmod +x NVIDIA-Linux-xx_xx_xxx.run
sh ./NVIDIA-Linux-xx_xx_xxx.run
```

follow the rest of the instruction.

- 3) finally, reboot your machine.

Note: If you're using **method 2** you need to install nvidia driver again if new kernel for linux is applied from `sudo update`. My advice, stick to **method 1**

For both method 1 and method 2, you can use `nvidia-smi` utility thru ubuntu commandline interface to test/verfity whether the driver is running or not. `nvidia-smi` is a command line utility that is intended to aid in the management and monitoring of NVIDIA GPU devices

```
File Edit View Search Terminal Help
vib@varhewte-com:~$ nvidia-smi
Fri Aug 21 22:14:58 2020

+-----+
| NVIDIA-SMI 440.64      Driver Version: 440.64      CUDA Version: 10.2      |
+-----+-----+
| GPU Name           Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf    Pwr:Usage/Cap|      Memory-Usage | GPU-Util  Compute M. |
+-----+-----+
| 0  GeForce GTX 1070  Off        | 00000800:01:00:0 | On          N/A      |
| 32%   49C   P0      35W / 151W  | 4422MiB / 8116MiB |   1%      Default   |
+-----+-----+

Processes:
GPU      PID     Type  Process name                      GPU Memory
Usage
+-----+
| 0       2071  G    /usr/lib/xorg/Xorg                 73MiB
| 0       2251  G    /usr/bin/gnome-shell              51MiB
| 0       7168  G    /usr/lib/xorg/Xorg                2410MiB
| 0       7184  G    /usr/bin/gnome-shell              523MiB
| 0      14958  G    /usr/lib/rstudio/bin/rstudio      319MiB
| 0      15193  G    /usr/lib/rstudio/bin/rstudio      307MiB
| 0      19471  G    ..AAAAAAAAAAAAAAAAAA ..shared-files 524MiB
+-----+
```

6 Setting Up CUDA toolkit

Now, when nvidia driver is already setup, we can now proceed to install [CUDA toolkit](#)

1. Download CUDA 10.1 from [here](#). Download the one with `runfile(local)`

[Home](#) > [High Performance Computing](#) > [CUDA Toolkit](#) > [CUDA Toolkit Archive](#) > [CUDA Toolkit 10.1 update1 Archive](#)

CUDA Toolkit 10.1 update1 Archive

Select Target Platform ⓘ

Click on the green buttons that describe your target platform. Only supported platforms will be shown.

Operating System

WindowsLinuxMac OSX

Architecture ⓘ

x86_64ppc64le

Distribution

FedoraOpenSUSERHELCentOSSELESUbuntu

Version

10.1010.0410.0410.04

Installer Type ⓘ

runfile (local)deb (local)deb (network)cluster (local)

Download Installer for Linux Ubuntu 18.04 x86_64

The base installer is available for download below.

Base Installer

Download (2.5 GB) ⬇

Installation Instructions:

1. Run ``sudo sh cuda_10.1.168_418.67_linux.run``

2. Follow the command-line prompts

The CUDA Toolkit contains Open-Source Software. The source code can be found [here](#).
The checksums for the installer and patches can be found in [Installer Checksums](#).
For further information, see the [Installation Guide for Linux](#) and the [CUDA Quick Start Guide](#).

- 2) run the following in commandline:

```
sudo chmod +x cuda_10.1.168_418.67_linux.run
sh ./cuda_10.1.168_418.67_linux.run
```

follow the rest of the instruction, but skip the driver part because you already install it

previously.

- 3) now, we need to add the path to our bash so that later ubuntu will know its path. open `.bashrc` using `vi` or `emacs` or `nano` and append this at the end of the file

```
export CUDA_HOME=/usr/local/cuda-10.1
export LD_LIBRARY_PATH=${CUDA_HOME}/lib64
export PATH=${CUDA_HOME}/bin:${PATH}
```

7 Summary

Now you have, a system with proper nvidia driver and CUDA toolkit. In the next note, we shall setup openmpi and mellanox for the hpcg benchmark.

8 Reference

1. [Ubuntu Linux Install Nvidia Driver](#)
2. [How to install the NVIDIA drivers on Ubuntu 18.04 Bionic Beaver Linux](#)
3. [How to install Nvidia video drivers on Ubuntu 18.04?](#)
4. [How to install CUDA 9.2 on Ubuntu 18.04](#)