

CUDA_examples REPOSITORY TUTORIAL:

CUDA programs step by step tutorial for executing repository programs. It consist of tip dashes.

1) obtain computer with included NVidia GPU graphics (programs are written in Nvidia corporation C extensions language with some C++11 capabilities - Compute Unified Device Architecture CUDA). If you have not any, I will provide you some new-parts proposition in 2017y:

- CPU: AMD A10 7860k,
- MB: Asrock FM2A88X+ (note PCIe 3.0 x16 bandwidth ~14GBps),
- RAM: 4x GOODRAM PLAY Blue 4GB,
- pendrive 16GB with Ubuntu desktop 64bit, power supply,
- GPU: Nvidia GTX 1060 6GB
 - tip: consider operating system distribution booting to RAM (f.e. modified Ubuntu),
 - tip: consider good quality monitors, chair and keyboard (for my best knowledge mouse is unnecessary),
 - tip: for parallel cluster consider adding SSD RAID 0 (#mdadm are not so computationally expensive, as you think, especially for multicore CPU) and make redundand above configuration,
 - tip: theoretically low – price used parts Dell R710 32GB + **GTX780** 3GB + PCIe: 2p 10GbE 4p GbE (useful link aggregations: #ifenslave, #bonding) – I did not check that configuration by myself, but should work after some PClex8 customization to fit graphics card slot,
 - tip: theoretical lower price – any used Personal Computer with PCIe 2.0x16 (f.e. Core2Quad + 4GB RAM + **GTX660** 2GB). I did not check that configuration by myself, but should work,

2) further consideration are for LINUX UBUNTU (checked for 16.04). *I have been forced to check that on Microsoft Windows 10: Visual Studio Community (2015) and alternatively on Notepad++ with command line (shell) and both were working great (with different run commands)*.

3) after signing in to operating system and making essential configurations (f.e. second sudo user for recovery mode) download CUDA toolkit from:

<https://developer.nvidia.com/cuda-toolkit>

4)to avoid:

- problems with lightdm log in (login loop)
- problems with driver istall ("Driver Installation failed: it appears, that a X server is running...")

via RUNFILE

5) and succesfully install a NVidia CUDA Toolkit on Ubuntu 16.04 64bit I have just had to do:

- login on live session on pendrive ("Try ubuntu, before install")
- add sudo user at live session:
 - #sudo adduser admin (#pass: admin1)
 - #sudo usermod -aG sudo admin
- logout from live session, log in as #admin
- download CUDA Toolkit from NVidia official site (~1.5GB)
- change privileges for downloaded installer file (DO NOT INSTALL AT THIS STEP!):
 - #sudo chmod +x cuda_X.X.run
- switch to console view:
 - #Ctr+Alt+F1 (to switch on terminal view)

- #Ctrl+Alt+F7 (to switch from terminal view to graphical server)
- at console view (Ctrl+Alt+F1) log in:
 - #login: admin
 - #pass: admin1
- stop graphical running service:
 - #sudo service lightdm stop
- check if graphical server is off - after switching Ctrl+Alt+F7 the monitor should be blank black, switch back on console view Ctrl+Alt+F1
- install CUDA Toolkit, with such configuration:
 - #sudo ./cuda_X.X.run
 - ##(press 'q' for license read skip)
 - #do not install OpenGL library (I do not know why – please do not ask)
 - #do not update system X configuration
 - #other options make yes and paths as default
- turn on graphical server:
 - #sudo service lightdm start
- log in as user (if you automatically log in as #ubuntu at live session log out):
 - #login: admin
 - #pass: admin1
- check if nvcc exists:
 - # sudo find /usr/ -name 'nvcc'

6) obtain git:

#sudo apt-get install git

7) clone my repo in home directory (~):

#git clone https://github.com/PiotrLenarczykAnonim/CUDA_examples.git

8) check whatever nvcc compiler works:

#cd CUDA_examples/01_makeSimple/

9) most of folders are configured for #make via BASH scripts:

#./RUN_COMMANDS.sh

10) Thrust library is delivered with CUDA Toolkit, but I strongly recommend for cloning repo Mr Jared Hoberock with examples:

git clone <https://github.com/thrust/thrust.git>

11) there are another repo with C++ several useful examples:

#git clone https://github.com/PiotrLenarczykAnonim/C-_examples.git

via .DEB PACKAGE

5deb) download download cudaXX.deb package from

<https://developer.nvidia.com/cuda-toolkit>

6deb) in console:

- switch to console view:
 - #Ctrl+Alt+F1 (to switch on terminal view)
 - #Ctrl+Alt+F7 (to switch from terminal view to graphical server)
- at console view (Ctrl+Alt+F1) log in:
 - #login: admin
 - #pass: admin1
- stop graphical running service:
 - #sudo service lightdm stop
- check if graphical server is off - after switching Ctrl+Alt+F7 the monitor should be blank black, switch back on console view Ctrl+Alt+F1
 - #sudo chmod +x cudaXX.deb
 - #sudo dpkg -i cudaXX.deb
 - #sudo apt-get update
 - #sudo apt-get install cuda g++-4.9 gcc-4.9

```
#sudo ln -s /usr/bin/g++-4.9 /usr/local/cuda/bin/g++  
#sudo ln -s /usr/bin/gcc-4.9 /usr/local/cuda/bin/gcc  
#sudo service lightdm start
```

7deb) similar to above 6) - 11)

Post Scriptum: Mostly I have been developing it on Dell Inspiron 7746 with i7 5500U, 16GB RAM 1666MHz, Nvidia GM108M GeForce 845M PCIe 3.0x4 2GB and SSD 1TB (OS: LINUX Ubuntu Desktop 16.04 64bit; LINUX Ubuntu Desktop 16.10 64bit). Also it was checked on PC: Intel i7 2660k, 16GB RAM 1333MHz, Nvidia GK110 GTX780 3GB PCIe 2.0x16, SSD 0.24TB (OS: LINUX Ubuntu 16.04 64bit).

Post Post Scriptum: If one will use customized liveCD from LINUX_tips repo, he or she should take into consideration that minimal recommended RAM size should be 8GB (or buy harddrive / pendrive).