

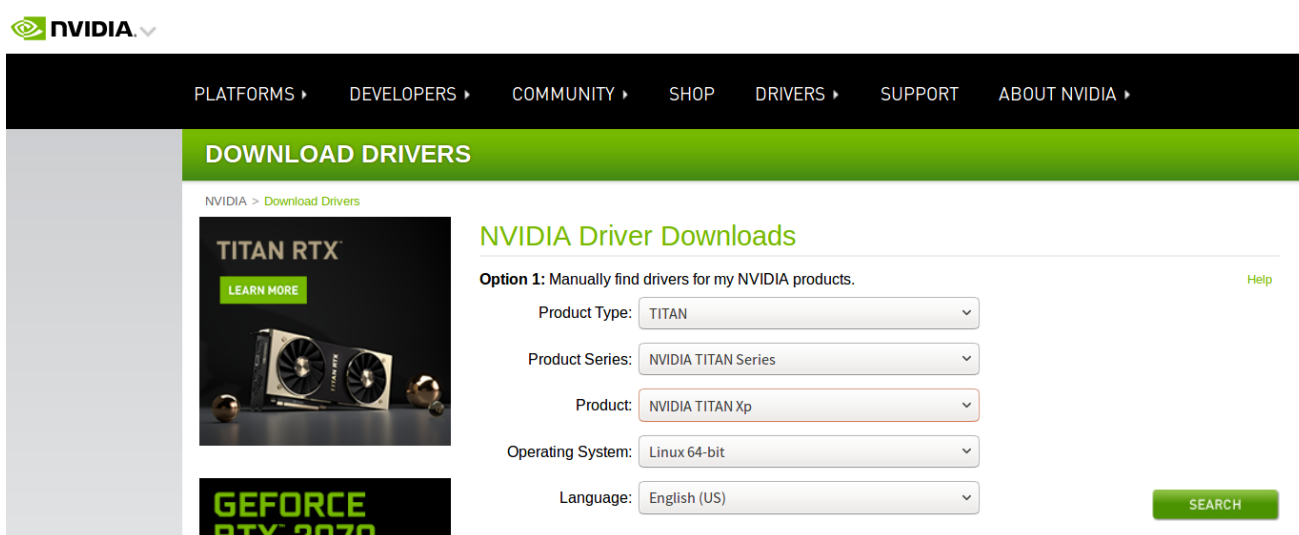
安装CUDA和cuDNN

(Ubuntu16.04+cuda9.0+cuDNN7.4.2)

1. 安装nvidia驱动

首先去Nvidia官网上查看适合你的GPU的驱动 (<http://www.nvidia.com/Download/index.aspx?lang=en-us>)。

选择GPU产品类型（本人用的是NVIDIA TITAN Xp），查找适合的驱动如下图：



找到的驱动版本如下所示：



下载NVIDIA驱动安装包（.run格式）。下载后的文件为：

/home/bai/Downloads/NVIDIA-Linux-x86_64-410.78.run

run格式文件安装较麻烦。

首先要禁用nouveau驱动。Nouveau是由第三方为NVIDIA显卡开发的一个开源3D驱动。Ubuntu默认集成了Nouveau驱动。而用户在安装NVIDIA官方私有驱动的时候Nouveau又成为了阻碍。若不禁用Nouveau，安装时总是报错。

具体步骤如下：

- **nouveau禁止命令写入文件**

```
sudo vim /etc/modprobe.d/blacklist.conf
```

文件末尾添加以下语句：

```
blacklist nouveau
blacklist lbm-nouveau
options nouveau modeset=0
alias nouveau off
alias lbm-nouveau off
```

- **调用指令禁止nouveau**

```
echo options nouveau modeset=0 | sudo tee -a /etc/modprobe.d/nouveau-kms.conf
```

- **更新内核**

```
sudo update-initramfs -u
```

- **重启系统**

```
sudo reboot
```

- **进入tty模式**

```
ctrl + alt+ F1
```

- **关闭x server**

```
sudo service lightdm stop
sudo init 3
```

- **切换NVIDIA安装包指定目录,赋予权限并进行安装**

```
cd ~/Downloads
mv NVIDIA-Linux-x86_64-410.78.run nvidia.run
chmod +x nvidia.run
sudo sh nvidia.run --no-opengl-files
```

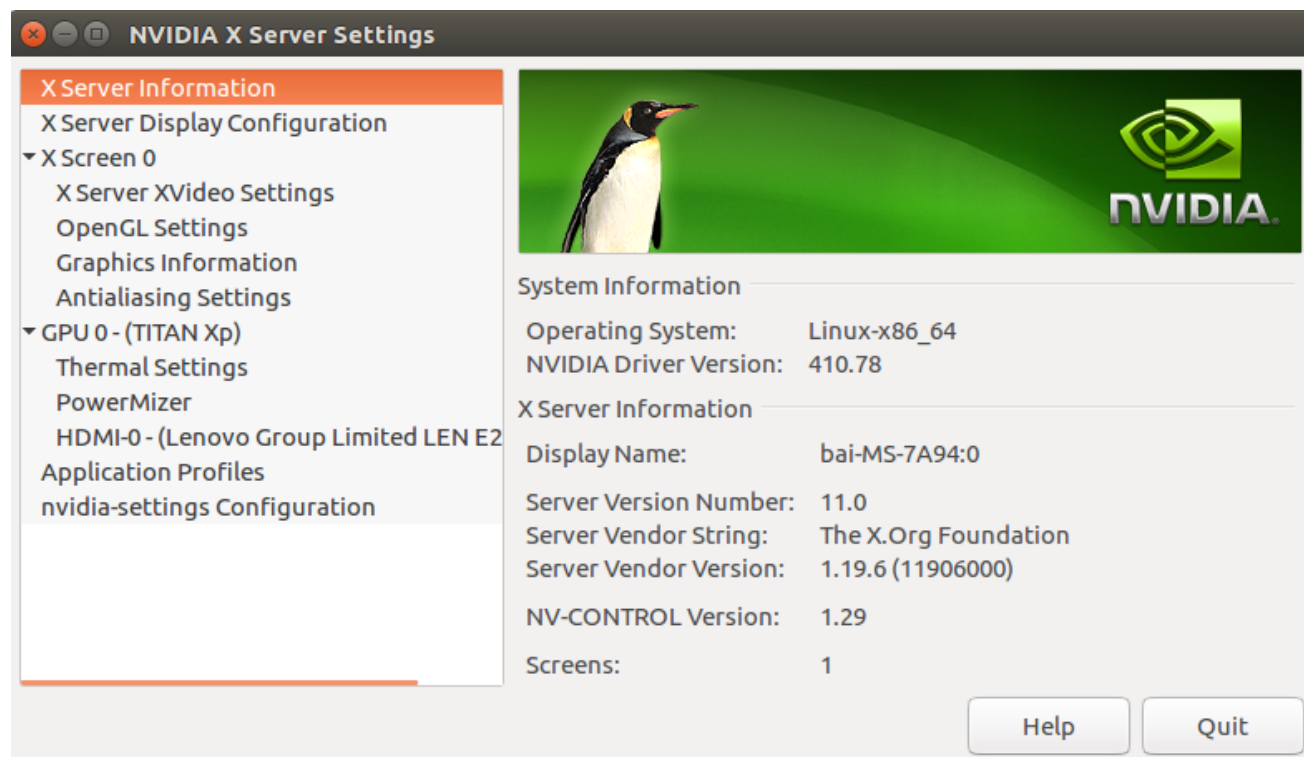
备注：no前面是双杠号

安装时可能有出错提示，不用理会，继续安装。

安装成功后，在图形界面下可以通过命令：

```
nvidia-settings
```

查看自己机器上详细的GPU信息，本人机器的信息如下：



执行完上述后，重启系统：

```
sudo reboot
```

2. 安装CUDA

cuda是nvidia的编程语言平台，想使用GPU就必须使用cuda。从这里下载 [cuda9.0\(https://developer.nvidia.com/cuda-toolkit\)](https://developer.nvidia.com/cuda-toolkit) 的安装文件。

首先选择合适的版本。

CUDA Toolkit 9.0 Downloads

Select Target Platform ⓘ

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

Operating System	Windows	Linux	Mac OSX			
Architecture ⓘ	x86_64	ppc64le				
Distribution	Fedora	OpenSUSE	RHEL	CentOS	SLES	Ubuntu
Version	17.04	16.04				
Installer Type ⓘ	runfile (local)	deb (local)	deb (network)	cluster (local)		


下载安装文件和补丁文件：

Download Installers for Linux Ubuntu 16.04 x86_64

The base installer is available for download below.

There are 4 patches available. These patches require the base installer to be installed first.


> Base Installer

Download (1.6 GB) 

Installation Instructions:

1. Run `sudo sh cuda_9.0.176_384.81_linux.run`
2. Follow the command-line prompts

> Patch 1 (Released Jan 25, 2018)

Download (113.8 MB) 


cuBLAS Patch Update: This update to CUDA 9.0 includes new GEMM kernels optimized for the Volta architecture and improved heuristics to select GEMM kernels for given input sizes.

> Patch 2 (Released Mar 5, 2018)

Download (70.5 MB) 


cuBLAS Patch Update: This update to CUDA 9 includes GEMM heuristics improvements to select the most optimized algorithms for input sizes commonly used in Deep Learning RNNs. The update also includes other bug-fixes and performance enhancements.

> Patch 3 (Released Jun 7, 2018)

Download (74.7 MB) 

cuBLAS Patch Update: This update to cuBLAS addresses issues with Convolutional Seq2Seq and RNN inference performance.

> Patch 4 (Released Aug 6, 2018)

Download (75.7 MB) 

cuBLAS Patch Update: This update to cuBLAS includes optimized implementations of GEMV operations for mixed precision input and output types and important fixes to address performance issues.

下载后的文件如下:

```
cuda_9.0.176_384.81_linux.run
cuda_9.0.176.1_linux.run
cuda_9.0.176.2_linux.run
cuda_9.0.176.3_linux.run
cuda_9.0.176.4_linux.run
```

执行如下语句, 运行runfile文件:

```
sudo sh cuda_9.0.176_384.81_linux.run
sudo sh cuda_9.0.176.1_linux.run
sudo sh cuda_9.0.176.2_linux.run
sudo sh cuda_9.0.176.3_linux.run
sudo sh cuda_9.0.176.4_linux.run
```

因为Nvidia驱动已经安装，这里就不要选择安装Nvidia驱动。其余的都直接默认或者选择是即可。使用：

```
sudo gedit /etc/profile
```

打开profile文件，在末尾处添加（注意不要有空格，否则会报错）：

```
export PATH=/usr/local/cuda-9.0/bin:$PATH
export LD_LIBRARY_PATH=/usr/local/cuda-9.0/lib64:$LD_LIBRARY_PATH
```

重启电脑：

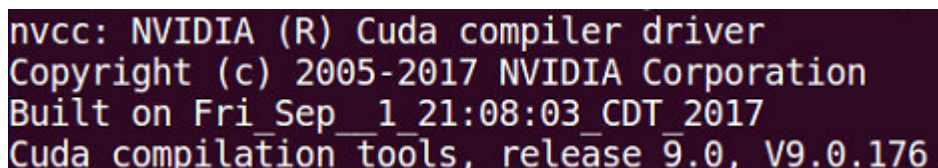
```
sudo reboot
```

测试cuda的Samples

```
cd /usr/local/cuda-9.0/samples/1_Uutilities/deviceQuery
sudo make
./deviceQuery
```

如果显示的是有关GPU的信息，则说明安装成功了。

测试cuda也可以通过命令：`nvcc -V` 查看。输出如下图所示：



```
nvcc: NVIDIA (R) Cuda compiler driver
Copyright (c) 2005-2017 NVIDIA Corporation
Built on Fri Sep 1 21:08:03 CDT 2017
Cuda compilation tools, release 9.0, V9.0.176
```

3. 安装cuDNN

去官网下载与CUDA 9.0搭配的cudnn版本。下载cudnn需要注册一个NVIDIA账号。

<https://developer.nvidia.com/rdp/cudnn-download>

官方已经给出了cuda与cudnn搭配的建议。

Download cuDNN v7.4.2 [Dec 14, 2018], for CUDA 9.0

我下载的是 cuDNN v7.4.2。在下图所示选择cuDNN Library for Linux，下载cudnn-9.0-linux-x64-v7.4.2.24.tgz

Library for Windows, Mac, Linux, Ubuntu and RedHat/Centos (x86_64 architecture)

[cuDNN Library for Windows 7](#)

[cuDNN Library for Windows 10](#)

[cuDNN Library for Linux](#) 

[cuDNN Runtime Library for Ubuntu16.04 \(Deb\)](#)

[cuDNN Developer Library for Ubuntu16.04 \(Deb\)](#)

[cuDNN Code Samples and User Guide for Ubuntu16.04 \(Deb\)](#)

[cuDNN Runtime Library for Ubuntu14.04 \(Deb\)](#)

[cuDNN Developer Library for Ubuntu14.04 \(Deb\)](#)

[cuDNN Code Samples and User Guide for Ubuntu14.04 \(Deb\)](#)

[cuDNN Runtime Library for RedHat/Centos 7.3 \(RPM\)](#)

[cuDNN Developer Library for RedHat/Centos 7.3 \(RPM\)](#)

[cuDNN Code Samples and User Guide for RedHat/Centos 7.3 \(RPM\)](#)

解压:

```
tar -xvf cudnn-9.0-linux-x64-v7.4.2.24.tgz
```

拷贝相关的库文件:

```
sudo cp include/cudnn.h /usr/local/cuda/include/  
sudo cp lib64/libcudnn* /usr/local/cuda/lib64/  
sudo chmod a+r /usr/local/cuda/include/cudnn.h /usr/local/cuda/lib64/libcudnn*
```

删除文件原来的软链接:

```
cd /usr/local/cuda/lib64  
sudo rm libcudnn.so libcudnn.so.7 //删除原来的链接  
sudo ln -s libcudnn.so.7.4.2 libcudnn.so.7 //生成新的链接  
sudo ln -s libcudnn.so.7 libcudnn.so  
sudo chmod a+r /usr/local/cuda/include/cudnn.h /usr/local/cuda/lib64/libcudnn*  
sudo ldconfig
```