```
In [ ]:  !apt-get --purge remove cuda nvidia* libnvidia-*
         !dpkg -l | grep cuda- | awk '{print $2}' | xargs -n1 dpkg --purge
         !apt-get remove cuda-*
         !apt autoremove
         !apt-get update
```

```
In [ ]:  !wget https://developer.nvidia.com/compute/cuda/9.2/Prod/local_installers/cuda-repo-ubuntu1604-9-2-local_9.2.88-1
         !dpkg -i cuda-repo-ubuntu1604-9-2-local_9.2.88-1_amd64.deb
         !apt-key add /var/cuda-repo-9-2-local/7fa2af80.pub
         !apt-get update
         !apt-get install cuda-9.2
```

```
--2021-11-27 06:40:49--  https://developer.nvidia.com/compute/cuda/9.2/Prod/local_installers/cuda-repo-ubuntu1604
-9-2-local_9.2.88-1_amd64
Resolving developer.nvidia.com (developer.nvidia.com)... 152.199.20.126
Connecting to developer.nvidia.com (developer.nvidia.com)|152.199.20.126|:443... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://developer.nvidia.com/compute/cuda/9.2/prod/local_installers/cuda-repo-ubuntu1604-9-2-local_9.2.
88-1_amd64 [following]
--2021-11-27 06:40:49--  https://developer.nvidia.com/compute/cuda/9.2/prod/local_installers/cuda-repo-ubuntu1604
-9-2-local_9.2.88-1_amd64
Reusing existing connection to developer.nvidia.com:443.
HTTP request sent, awaiting response... 302 Found
Location: https://developer.download.nvidia.com/compute/cuda/9.2/secure/Prod/local_installers/cuda-repo-ubuntu160
4-9-2-local_9.2.88-1_amd64.deb?gBFM8JTsVDbNCzo2UTcGL6F5ch5iCkTqeIq89Dhe4DzqokaFfXYY-eB-e3KeRPcgPW3j2GGzCQ2cjdWTEw
u303VWk27kb67plL693vnvt1XPxo_JoaiRKJVwRRIlcKTxeWu4bzWN4lyBavEzY_4j7Eyt42NrhFse8bQKZSqeUdewpGE7Vk3wxfJUerGhpUOEZ7n
OmuM7UnkyDaKFLnY [following]
--2021-11-27 06:40:50--  https://developer.download.nvidia.com/compute/cuda/9.2/secure/Prod/local_installers/cuda
-repo-ubuntu1604-9-2-local_9.2.88-1_amd64.deb?gBFM8JTsVDbNCzo2UTcGL6F5ch5iCkTqeIq89Dhe4DzqokaFfXYY-eB-e3KeRPcgPW3
j2GGzCQ2cjdWTEwu303VWk27kb67plL693vnvt1XPxo_JoaiRKJVwRRIlcKTxeWu4bzWN4lyBavEzY_4j7Eyt42NrhFse8bQKZSqeUdewpGE7Vk3w
xfJUerGhpUOEZ7nOmuM7UnkyDaKFLnY
Resolving developer.download.nvidia.com (developer.download.nvidia.com)... 152.199.20.126
Connecting to developer.download.nvidia.com (developer.download.nvidia.com)|152.199.20.126|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1267391958 (1.2G) [application/x-deb]
Saving to: 'cuda-repo-ubuntu1604-9-2-local_9.2.88-1_amd64.deb'

cuda-repo-ubuntu160 100%[===================>]   1.18G   169MB/s    in 7.2s

2021-11-27 06:40:57 (167 MB/s) - 'cuda-repo-ubuntu1604-9-2-local_9.2.88-1_amd64.deb' saved [1267391958/1267391958
]

Selecting previously unselected package cuda-repo-ubuntu1604-9-2-local.
(Reading database ... 111685 files and directories currently installed.)
Preparing to unpack cuda-repo-ubuntu1604-9-2-local_9.2.88-1_amd64.deb ...
Unpacking cuda-repo-ubuntu1604-9-2-local (9.2.88-1) ...
Setting up cuda-repo-ubuntu1604-9-2-local (9.2.88-1) ...
OK
Get:1 file:/var/cuda-repo-9-2-local  InRelease
Ign:1 file:/var/cuda-repo-9-2-local  InRelease
Get:2 file:/var/cuda-repo-9-2-local  Release [574 B]
Get:2 file:/var/cuda-repo-9-2-local  Release [574 B]
Get:3 file:/var/cuda-repo-9-2-local  Release.gpg [819 B]
Get:3 file:/var/cuda-repo-9-2-local  Release.gpg [819 B]
Hit:4 http://archive.ubuntu.com/ubuntu bionic InRelease
Hit:5 http://archive.ubuntu.com/ubuntu bionic-updates InRelease
Hit:6 http://archive.ubuntu.com/ubuntu bionic-backports InRelease
Hit:7 https://cloud.r-project.org/bin/linux/ubuntu bionic-cran40/ InRelease
Hit:8 http://ppa.launchpad.net/c2d4u.team/c2d4u4.0+/ubuntu bionic InRelease
Hit:9 http://ppa.launchpad.net/cran/libgit2/ubuntu bionic InRelease
Hit:10 http://ppa.launchpad.net/deadsnakes/ppa/ubuntu bionic InRelease
Hit:11 http://ppa.launchpad.net/graphics-drivers/ppa/ubuntu bionic InRelease
Hit:12 http://security.ubuntu.com/ubuntu bionic-security InRelease
Ign:13 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  InRelease
Get:14 file:/var/cuda-repo-9-2-local  Packages [18.7 kB]
Ign:15 https://developer.download.nvidia.com/compute/machine-learning/repos/ubuntu1804/x86_64  InRelease
Hit:16 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  Release
Hit:17 https://developer.download.nvidia.com/compute/machine-learning/repos/ubuntu1804/x86_64  Release
Reading package lists... Done
Reading package lists... Done
Building dependency tree
Reading state information... Done
Note, selecting 'cuda-9-2' for regex 'cuda-9.2'
Note, selecting 'libcuda-9.2-1' for regex 'cuda-9.2'
The following additional packages will be installed:
  cuda-command-line-tools-9-2 cuda-compiler-9-2 cuda-cublas-9-2
  cuda-cublas-dev-9-2 cuda-cudart-9-2 cuda-cudart-dev-9-2 cuda-cufft-9-2
  cuda-cufft-dev-9-2 cuda-cuobjdump-9-2 cuda-cupti-9-2 cuda-curand-9-2
  cuda-curand-dev-9-2 cuda-cusolver-9-2 cuda-cusolver-dev-9-2
  cuda-cusparse-9-2 cuda-cusparse-dev-9-2 cuda-demo-suite-9-2
  cuda-documentation-9-2 cuda-driver-dev-9-2 cuda-drivers cuda-drivers-495
```

```
  cuda-gdb-9-2 cuda-gpu-library-advisor-9-2 cuda-libraries-9-2
  cuda-libraries-dev-9-2 cuda-license-9-2 cuda-memcheck-9-2
  cuda-misc-headers-9-2 cuda-npp-9-2 cuda-npp-dev-9-2 cuda-nsight-9-2
  cuda-nvcc-9-2 cuda-nvdisasm-9-2 cuda-nvgraph-9-2 cuda-nvgraph-dev-9-2
  cuda-nvml-dev-9-2 cuda-nvprof-9-2 cuda-nvprune-9-2 cuda-nvrtc-9-2
  cuda-nvrtc-dev-9-2 cuda-nvtx-9-2 cuda-nvvp-9-2 cuda-runtime-9-2
  cuda-samples-9-2 cuda-toolkit-9-2 cuda-tools-9-2 cuda-visual-tools-9-2
  default-jre dkms dmsetup fakeroot fonts-dejavu-core fonts-dejavu-extra
  freeglut3 freeglut3-dev keyboard-configuration libargon2-0
  libatk-wrapper-java libatk-wrapper-java-jni libcap2 libcryptsetup12
  libdevmapper1.02.1 libfakeroot libfontenc1 libidn11 libip4tc0 libjansson4
  libnss-systemd libnvidia-cfg1-495 libnvidia-common-495 libnvidia-compute-495
  libnvidia-decode-495 libnvidia-encode-495 libnvidia-extra-495
  libnvidia-fbc1-495 libnvidia-gl-495 libpam-systemd libpolkit-agent-1-0
  libpolkit-backend-1-0 libpolkit-gobject-1-0 libxfont2 libxi-dev libxkbfile1
  libxmu-dev libxmu-headers libxnvctrl0 libxtst6 libxxf86dga1
  networkd-dispatcher nvidia-compute-utils-495 nvidia-dkms-495
  nvidia-driver-495 nvidia-kernel-common-495 nvidia-kernel-source-495
  nvidia-modprobe nvidia-prime nvidia-settings nvidia-utils-495 openjdk-11-jre
  policykit-1 policykit-1-gnome python3-xkit screen-resolution-extra systemd
  systemd-sysv udev x11-utils x11-xkb-utils xfonts-base xfonts-encodings
  xfonts-utils xserver-common xserver-xorg-core-hwe-18.04
  xserver-xorg-video-nvidia-495
Suggested packages:
  python3-apport menu iw | wireless-tools systemd-container mesa-utils xfs
  | xserver xfonts-100dpi | xfonts-75dpi xfonts-scalable
Recommended packages:
  libnvidia-compute-495:i386 libnvidia-decode-495:i386
  libnvidia-encode-495:i386 libnvidia-fbc1-495:i386 libnvidia-gl-495:i386
The following NEW packages will be installed:
  cuda-9-2 cuda-command-line-tools-9-2 cuda-compiler-9-2 cuda-cublas-9-2
  cuda-cublas-dev-9-2 cuda-cudart-9-2 cuda-cudart-dev-9-2 cuda-cufft-9-2
  cuda-cufft-dev-9-2 cuda-cuobjdump-9-2 cuda-cupti-9-2 cuda-curand-9-2
  cuda-curand-dev-9-2 cuda-cusolver-9-2 cuda-cusolver-dev-9-2
  cuda-cusparse-9-2 cuda-cusparse-dev-9-2 cuda-demo-suite-9-2
  cuda-documentation-9-2 cuda-driver-dev-9-2 cuda-drivers cuda-drivers-495
  cuda-gdb-9-2 cuda-gpu-library-advisor-9-2 cuda-libraries-9-2
  cuda-libraries-dev-9-2 cuda-license-9-2 cuda-memcheck-9-2
  cuda-misc-headers-9-2 cuda-npp-9-2 cuda-npp-dev-9-2 cuda-nsight-9-2
  cuda-nvcc-9-2 cuda-nvdisasm-9-2 cuda-nvgraph-9-2 cuda-nvgraph-dev-9-2
  cuda-nvml-dev-9-2 cuda-nvprof-9-2 cuda-nvprune-9-2 cuda-nvrtc-9-2
  cuda-nvrtc-dev-9-2 cuda-nvtx-9-2 cuda-nvvp-9-2 cuda-runtime-9-2
  cuda-samples-9-2 cuda-toolkit-9-2 cuda-tools-9-2 cuda-visual-tools-9-2
  default-jre dkms dmsetup fakeroot fonts-dejavu-core fonts-dejavu-extra
  freeglut3 freeglut3-dev keyboard-configuration libargon2-0
  libatk-wrapper-java libatk-wrapper-java-jni libcap2 libcryptsetup12
  libdevmapper1.02.1 libfakeroot libfontenc1 libidn11 libip4tc0 libjansson4
  libnss-systemd libnvidia-cfg1-495 libnvidia-common-495 libnvidia-compute-495
  libnvidia-decode-495 libnvidia-encode-495 libnvidia-extra-495
  libnvidia-fbc1-495 libnvidia-gl-495 libpam-systemd libpolkit-agent-1-0
  libpolkit-backend-1-0 libpolkit-gobject-1-0 libxfont2 libxi-dev libxkbfile1
  libxmu-dev libxmu-headers libxnvctrl0 libxtst6 libxxf86dga1
  networkd-dispatcher nvidia-compute-utils-495 nvidia-dkms-495
  nvidia-driver-495 nvidia-kernel-common-495 nvidia-kernel-source-495
  nvidia-modprobe nvidia-prime nvidia-settings nvidia-utils-495 openjdk-11-jre
  policykit-1 policykit-1-gnome python3-xkit screen-resolution-extra systemd
  systemd-sysv udev x11-utils x11-xkb-utils xfonts-base xfonts-encodings
  xfonts-utils xserver-common xserver-xorg-core-hwe-18.04
  xserver-xorg-video-nvidia-495
0 upgraded, 115 newly installed, 0 to remove and 38 not upgraded.
Need to get 250 MB/1,396 MB of archives.
After this operation, 3,311 MB of additional disk space will be used.
Get:1 file:/var/cuda-repo-9-2-local  cuda-license-9-2 9.2.88-1 [22.0 kB]
Get:2 file:/var/cuda-repo-9-2-local  cuda-misc-headers-9-2 9.2.88-1 [640 kB]
Get:3 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 keyboard-configuration all 1.178ubuntu2.9 [369 k
B]
Get:4 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  nvidia-modprobe 495.29.05-0ubun
tu1 [19.8 kB]
Get:5 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  libxnvctrl0 495.29.05-0ubuntu1
[21.4 kB]
Get:6 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  nvidia-settings 495.29.05-0ubun
tu1 [923 kB]
Get:7 http://archive.ubuntu.com/ubuntu bionic/main amd64 libcap2 amd64 1:2.25-1.2 [13.0 kB]
Get:8 http://archive.ubuntu.com/ubuntu bionic/main amd64 libargon2-0 amd64 0~20161029-1.1 [19.9 kB]
Get:9 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libdevmapper1.02.1 amd64 2:1.02.145-4.1ubuntu3.1
8.04.3 [127 kB]
Get:10 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libcryptsetup12 amd64 2:2.0.2-1ubuntu1.2 [134 k
B]
Get:11 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libidn11 amd64 1.33-2.1ubuntu1.2 [46.6 kB]
Get:12 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  cuda-drivers-495 495.29.05-1 [
2,612 B]
Get:13 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64  cuda-drivers 495.29.05-1 [2,50
0 B]
```

```
Get:14 http://archive.ubuntu.com/ubuntu bionic/main amd64 libip4tc0 amd64 1.6.1-2ubuntu2 [19.6 kB]
Get:15 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 systemd amd64 237-3ubuntu10.52 [2,913 kB]
Get:16 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 systemd-sysv amd64 237-3ubuntu10.52 [13.6 kB]
Get:17 http://archive.ubuntu.com/ubuntu bionic/main amd64 libxxf86dga1 amd64 2:1.1.4-1 [13.7 kB]
Get:18 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 dmsetup amd64 2:1.02.145-4.1ubuntu3.18.04.3 [74
.4 kB]
Get:19 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libnss-systemd amd64 237-3ubuntu10.52 [105 kB]
Get:20 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libpam-systemd amd64 237-3ubuntu10.52 [107 kB]
Get:21 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 networkd-dispatcher all 1.7-0ubuntu3.3 [13.3 kB
]
Get:22 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 udev amd64 237-3ubuntu10.52 [1,102 kB]
Get:23 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libpolkit-gobject-1-0 amd64 0.105-20ubuntu0.18.
04.5 [36.4 kB]
Get:24 http://archive.ubuntu.com/ubuntu bionic/main amd64 libxtst6 amd64 2:1.2.3-1 [12.8 kB]
Get:25 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 openjdk-11-jre amd64 11.0.11+9-0ubuntu2~18.04 [
174 kB]
Get:26 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 default-jre amd64 2:1.11-68ubuntu1~18.04.1 [1,0
76 B]
Get:27 http://archive.ubuntu.com/ubuntu bionic/universe amd64 freeglut3 amd64 2.8.1-3 [73.6 kB]
Get:28 http://archive.ubuntu.com/ubuntu bionic/universe amd64 freeglut3-dev amd64 2.8.1-3 [124 kB]
Get:29 http://archive.ubuntu.com/ubuntu bionic/main amd64 libxmu-headers all 2:1.1.2-2 [54.3 kB]
Get:30 http://archive.ubuntu.com/ubuntu bionic/main amd64 libxmu-dev amd64 2:1.1.2-2 [49.0 kB]
Get:31 http://archive.ubuntu.com/ubuntu bionic/main amd64 libxi-dev amd64 2:1.7.9-1 [186 kB]
Get:32 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 libnvidia-common-495 all 495.44-0ubuntu0.
18.04.1 [9,260 B]
Get:33 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 libnvidia-compute-495 amd64 495.44-0ubunt
u0.18.04.1 [31.3 MB]
Get:34 file:/var/cuda-repo-9-2-local  cuda-nvcc-9-2 9.2.88-1 [15.4 MB]
Get:35 file:/var/cuda-repo-9-2-local  cuda-cuobjdump-9-2 9.2.88-1 [129 kB]
Get:36 file:/var/cuda-repo-9-2-local  cuda-nvprune-9-2 9.2.88-1 [36.7 kB]
Get:37 file:/var/cuda-repo-9-2-local  cuda-compiler-9-2 9.2.88-1 [2,518 B]
Get:38 file:/var/cuda-repo-9-2-local  cuda-nvdisasm-9-2 9.2.88-1 [17.4 MB]
Get:39 file:/var/cuda-repo-9-2-local  cuda-gdb-9-2 9.2.88-1 [2,765 kB]
Get:40 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 libnvidia-decode-495 amd64 495.44-0ubuntu
0.18.04.1 [1,267 kB]
Get:41 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 libnvidia-encode-495 amd64 495.44-0ubuntu
0.18.04.1 [40.8 kB]
Get:42 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 libnvidia-fbc1-495 amd64 495.44-0ubuntu0.
18.04.1 [45.7 kB]
Get:43 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 libnvidia-gl-495 amd64 495.44-0ubuntu0.18
.04.1 [150 MB]
Get:44 file:/var/cuda-repo-9-2-local  cuda-nvprof-9-2 9.2.88-1 [4,737 kB]
Get:45 file:/var/cuda-repo-9-2-local  cuda-memcheck-9-2 9.2.88-1 [137 kB]
Get:46 file:/var/cuda-repo-9-2-local  cuda-cudart-9-2 9.2.88-1 [97.8 kB]
Get:47 file:/var/cuda-repo-9-2-local  cuda-driver-dev-9-2 9.2.88-1 [11.1 kB]
Get:48 file:/var/cuda-repo-9-2-local  cuda-cudart-dev-9-2 9.2.88-1 [718 kB]
Get:49 file:/var/cuda-repo-9-2-local  cuda-cupti-9-2 9.2.88-1 [1,537 kB]
Get:50 file:/var/cuda-repo-9-2-local  cuda-gpu-library-advisor-9-2 9.2.88-1 [1,002 kB]
Get:51 file:/var/cuda-repo-9-2-local  cuda-nvtx-9-2 9.2.88-1 [24.3 kB]
Get:52 file:/var/cuda-repo-9-2-local  cuda-command-line-tools-9-2 9.2.88-1 [26.3 kB]
Get:53 file:/var/cuda-repo-9-2-local  cuda-nsight-9-2 9.2.88-1 [2,580 B]
Get:54 file:/var/cuda-repo-9-2-local  cuda-nvvp-9-2 9.2.88-1 [2,528 B]
Get:55 file:/var/cuda-repo-9-2-local  cuda-nvrtc-9-2 9.2.88-1 [5,908 kB]
Get:56 file:/var/cuda-repo-9-2-local  cuda-nvrtc-dev-9-2 9.2.88-1 [9,318 B]
Get:57 file:/var/cuda-repo-9-2-local  cuda-cusolver-9-2 9.2.88-1 [31.1 MB]
Get:58 file:/var/cuda-repo-9-2-local  cuda-cusolver-dev-9-2 9.2.88-1 [8,184 kB]
Get:59 file:/var/cuda-repo-9-2-local  cuda-cublas-9-2 9.2.88-1 [24.9 MB]
Get:60 file:/var/cuda-repo-9-2-local  cuda-cublas-dev-9-2 9.2.88-1 [49.1 MB]
Get:61 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 nvidia-compute-utils-495 amd64 495.44-0ub
untu0.18.04.1 [105 kB]
Get:62 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 dkms all 2.3-3ubuntu9.7 [68.1 kB]
Get:63 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 nvidia-kernel-source-495 amd64 495.44-0ub
untu0.18.04.1 [27.1 MB]
Get:64 file:/var/cuda-repo-9-2-local  cuda-cufft-9-2 9.2.88-1 [51.5 MB]
Get:65 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 nvidia-kernel-common-495 amd64 495.44-0ub
untu0.18.04.1 [18.8 MB]
Get:66 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 nvidia-dkms-495 amd64 495.44-0ubuntu0.18.
04.1 [28.2 kB]
Get:67 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 libnvidia-extra-495 amd64 495.44-0ubuntu0
.18.04.1 [45.1 kB]
Get:68 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 nvidia-utils-495 amd64 495.44-0ubuntu0.18
.04.1 [372 kB]
Get:69 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 libnvidia-cfg1-495 amd64 495.44-0ubuntu0.
18.04.1 [78.2 kB]
Get:70 http://archive.ubuntu.com/ubuntu bionic/main amd64 libxkbfile1 amd64 1:1.0.9-2 [64.6 kB]
Get:71 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 x11-xkb-utils amd64 7.7+3ubuntu0.18.04.1 [160 k
B]
Get:72 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 xserver-common all 2:1.19.6-1ubuntu4.9 [26.8 kB
]
Get:73 http://archive.ubuntu.com/ubuntu bionic/main amd64 libfontenc1 amd64 1:1.1.3-1 [13.9 kB]
Get:74 http://archive.ubuntu.com/ubuntu bionic/main amd64 libxfont2 amd64 1:2.0.3-1 [91.7 kB]
Get:75 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 xserver-xorg-core-hwe-18.04 amd64 2:1.20.8-2ubu
ntu2.2~18.04.5 [1,334 kB]
```

```
Get:76 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 xserver-xorg-video-nvidia-495 amd64 495.4
4-0ubuntu0.18.04.1 [1,387 kB]
Get:77 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 nvidia-driver-495 amd64 495.44-0ubuntu0.1
8.04.1 [448 kB]
Get:78 http://archive.ubuntu.com/ubuntu bionic/main amd64 python3-xkit all 0.5.0ubuntu2 [18.6 kB]
Get:79 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libpolkit-agent-1-0 amd64 0.105-20ubuntu0.18.04
.5 [14.9 kB]
Get:80 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 libpolkit-backend-1-0 amd64 0.105-20ubuntu0.18.
04.5 [36.3 kB]
Get:81 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 policykit-1 amd64 0.105-20ubuntu0.18.04.5 [53.5
kB]
Get:82 http://archive.ubuntu.com/ubuntu bionic/main amd64 policykit-1-gnome amd64 0.105-6ubuntu2 [24.0 kB]
Get:83 http://archive.ubuntu.com/ubuntu bionic/main amd64 screen-resolution-extra all 0.17.3 [11.7 kB]
Get:84 http://archive.ubuntu.com/ubuntu bionic/main amd64 libjansson4 amd64 2.11-1 [29.3 kB]
Get:85 http://archive.ubuntu.com/ubuntu bionic/main amd64 libfakeroot amd64 1.22-2ubuntu1 [25.9 kB]
Get:86 http://archive.ubuntu.com/ubuntu bionic/main amd64 fakeroot amd64 1.22-2ubuntu1 [62.3 kB]
Get:87 http://archive.ubuntu.com/ubuntu bionic/main amd64 fonts-dejavu-core all 2.37-1 [1,041 kB]
Get:88 http://archive.ubuntu.com/ubuntu bionic/main amd64 fonts-dejavu-extra all 2.37-1 [1,953 kB]
Get:89 http://archive.ubuntu.com/ubuntu bionic/main amd64 x11-utils amd64 7.7+3build1 [196 kB]
Get:90 http://archive.ubuntu.com/ubuntu bionic/main amd64 libatk-wrapper-java all 0.33.3-20ubuntu0.1 [34.7 kB]
Get:91 http://archive.ubuntu.com/ubuntu bionic/main amd64 libatk-wrapper-java-jni amd64 0.33.3-20ubuntu0.1 [28.3
kB]
Get:92 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 nvidia-prime all 0.8.16~0.18.04.1 [9,224 B]
Get:93 http://archive.ubuntu.com/ubuntu bionic/main amd64 xfonts-encodings all 1:1.0.4-2 [573 kB]
Get:94 http://archive.ubuntu.com/ubuntu bionic/main amd64 xfonts-utils amd64 1:7.7+6 [91.5 kB]
Get:95 http://archive.ubuntu.com/ubuntu bionic/main amd64 xfonts-base all 1:1.0.4+nmu1 [5,914 kB]
Get:96 file:/var/cuda-repo-9-2-local  cuda-cufft-dev-9-2 9.2.88-1 [106 MB]
Get:97 file:/var/cuda-repo-9-2-local  cuda-curand-9-2 9.2.88-1 [38.8 MB]
Get:98 file:/var/cuda-repo-9-2-local  cuda-curand-dev-9-2 9.2.88-1 [57.8 MB]
Get:99 file:/var/cuda-repo-9-2-local  cuda-cusparse-9-2 9.2.88-1 [27.6 MB]
Get:100 file:/var/cuda-repo-9-2-local  cuda-cusparse-dev-9-2 9.2.88-1 [27.8 MB]
Get:101 file:/var/cuda-repo-9-2-local  cuda-npp-9-2 9.2.88-1 [52.1 MB]
Get:102 file:/var/cuda-repo-9-2-local  cuda-npp-dev-9-2 9.2.88-1 [52.0 MB]
Get:103 file:/var/cuda-repo-9-2-local  cuda-nvml-dev-9-2 9.2.88-1 [49.4 kB]
Get:104 file:/var/cuda-repo-9-2-local  cuda-nvgraph-9-2 9.2.88-1 [11.7 MB]
Get:105 file:/var/cuda-repo-9-2-local  cuda-nvgraph-dev-9-2 9.2.88-1 [30.0 MB]
Get:106 file:/var/cuda-repo-9-2-local  cuda-visual-tools-9-2 9.2.88-1 [396 MB]
Get:107 file:/var/cuda-repo-9-2-local  cuda-tools-9-2 9.2.88-1 [2,486 B]
Get:108 file:/var/cuda-repo-9-2-local  cuda-samples-9-2 9.2.88-1 [76.3 MB]
Get:109 file:/var/cuda-repo-9-2-local  cuda-documentation-9-2 9.2.88-1 [50.4 MB]
Get:110 file:/var/cuda-repo-9-2-local  cuda-libraries-dev-9-2 9.2.88-1 [2,598 B]
Get:111 file:/var/cuda-repo-9-2-local  cuda-toolkit-9-2 9.2.88-1 [2,828 B]
Get:112 file:/var/cuda-repo-9-2-local  cuda-libraries-9-2 9.2.88-1 [2,568 B]
Get:113 file:/var/cuda-repo-9-2-local  cuda-runtime-9-2 9.2.88-1 [2,530 B]
Get:114 file:/var/cuda-repo-9-2-local  cuda-demo-suite-9-2 9.2.88-1 [3,889 kB]
Get:115 file:/var/cuda-repo-9-2-local  cuda-9-2 9.2.88-1 [2,560 B]
Fetched 250 MB in 23s (10.9 MB/s)
Extracting templates from packages: 100%
Preconfiguring packages ...
Selecting previously unselected package keyboard-configuration.
(Reading database ... 111758 files and directories currently installed.)
Preparing to unpack .../0-keyboard-configuration_1.178ubuntu2.9_all.deb ...
Unpacking keyboard-configuration (1.178ubuntu2.9) ...
Selecting previously unselected package libcap2:amd64.
Preparing to unpack .../1-libcap2_1%3a2.25-1.2_amd64.deb ...
Unpacking libcap2:amd64 (1:2.25-1.2) ...
Selecting previously unselected package libargon2-0:amd64.
Preparing to unpack .../2-libargon2-0_0~20161029-1.1_amd64.deb ...
Unpacking libargon2-0:amd64 (0~20161029-1.1) ...
Selecting previously unselected package libdevmapper1.02.1:amd64.
Preparing to unpack .../3-libdevmapper1.02.1_2%3a1.02.145-4.1ubuntu3.18.04.3_amd64.deb ...
Unpacking libdevmapper1.02.1:amd64 (2:1.02.145-4.1ubuntu3.18.04.3) ...
Selecting previously unselected package libcryptsetup12:amd64.
Preparing to unpack .../4-libcryptsetup12_2%3a2.0.2-1ubuntu1.2_amd64.deb ...
Unpacking libcryptsetup12:amd64 (2:2.0.2-1ubuntu1.2) ...
Selecting previously unselected package libidn11:amd64.
Preparing to unpack .../5-libidn11_1.33-2.1ubuntu1.2_amd64.deb ...
Unpacking libidn11:amd64 (1.33-2.1ubuntu1.2) ...
Selecting previously unselected package libip4tc0:amd64.
Preparing to unpack .../6-libip4tc0_1.6.1-2ubuntu2_amd64.deb ...
Unpacking libip4tc0:amd64 (1.6.1-2ubuntu2) ...
Setting up libcap2:amd64 (1:2.25-1.2) ...
Setting up libargon2-0:amd64 (0~20161029-1.1) ...
Setting up libdevmapper1.02.1:amd64 (2:1.02.145-4.1ubuntu3.18.04.3) ...
Setting up libcryptsetup12:amd64 (2:2.0.2-1ubuntu1.2) ...
Setting up libidn11:amd64 (1.33-2.1ubuntu1.2) ...
Setting up libip4tc0:amd64 (1.6.1-2ubuntu2) ...
Selecting previously unselected package systemd.
(Reading database ... 111810 files and directories currently installed.)
Preparing to unpack .../systemd_237-3ubuntu10.52_amd64.deb ...
Unpacking systemd (237-3ubuntu10.52) ...
Setting up systemd (237-3ubuntu10.52) ...
Selecting previously unselected package systemd-sysv.
```

```
(Reading database ... 112492 files and directories currently installed.)
Preparing to unpack .../000-systemd-sysv_237-3ubuntu10.52_amd64.deb ...
Unpacking systemd-sysv (237-3ubuntu10.52) ...
Selecting previously unselected package libxxf86dga1:amd64.
Preparing to unpack .../001-libxxf86dga1_2%3a1.1.4-1_amd64.deb ...
Unpacking libxxf86dga1:amd64 (2:1.1.4-1) ...
Selecting previously unselected package dmsetup.
Preparing to unpack .../002-dmsetup_2%3a1.02.145-4.1ubuntu3.18.04.3_amd64.deb ...
Unpacking dmsetup (2:1.02.145-4.1ubuntu3.18.04.3) ...
Selecting previously unselected package libnss-systemd:amd64.
Preparing to unpack .../003-libnss-systemd_237-3ubuntu10.52_amd64.deb ...
Unpacking libnss-systemd:amd64 (237-3ubuntu10.52) ...
Selecting previously unselected package libpam-systemd:amd64.
Preparing to unpack .../004-libpam-systemd_237-3ubuntu10.52_amd64.deb ...
Unpacking libpam-systemd:amd64 (237-3ubuntu10.52) ...
Selecting previously unselected package networkd-dispatcher.
Preparing to unpack .../005-networkd-dispatcher_1.7-0ubuntu3.3_all.deb ...
Unpacking networkd-dispatcher (1.7-0ubuntu3.3) ...
Selecting previously unselected package udev.
Preparing to unpack .../006-udev_237-3ubuntu10.52_amd64.deb ...
Unpacking udev (237-3ubuntu10.52) ...
Selecting previously unselected package libpolkit-gobject-1-0:amd64.
Preparing to unpack .../007-libpolkit-gobject-1-0_0.105-20ubuntu0.18.04.5_amd64.deb ...
Unpacking libpolkit-gobject-1-0:amd64 (0.105-20ubuntu0.18.04.5) ...
Selecting previously unselected package cuda-license-9-2.
Preparing to unpack .../008-cuda-license-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-license-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-misc-headers-9-2.
Preparing to unpack .../009-cuda-misc-headers-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-misc-headers-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-nvcc-9-2.
Preparing to unpack .../010-cuda-nvcc-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-nvcc-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-cuobjdump-9-2.
Preparing to unpack .../011-cuda-cuobjdump-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-cuobjdump-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-nvprune-9-2.
Preparing to unpack .../012-cuda-nvprune-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-nvprune-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-compiler-9-2.
Preparing to unpack .../013-cuda-compiler-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-compiler-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-nvdisasm-9-2.
Preparing to unpack .../014-cuda-nvdisasm-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-nvdisasm-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-gdb-9-2.
Preparing to unpack .../015-cuda-gdb-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-gdb-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-nvprof-9-2.
Preparing to unpack .../016-cuda-nvprof-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-nvprof-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-memcheck-9-2.
Preparing to unpack .../017-cuda-memcheck-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-memcheck-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-cudart-9-2.
Preparing to unpack .../018-cuda-cudart-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-cudart-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-driver-dev-9-2.
Preparing to unpack .../019-cuda-driver-dev-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-driver-dev-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-cudart-dev-9-2.
Preparing to unpack .../020-cuda-cudart-dev-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-cudart-dev-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-cupti-9-2.
Preparing to unpack .../021-cuda-cupti-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-cupti-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-gpu-library-advisor-9-2.
Preparing to unpack .../022-cuda-gpu-library-advisor-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-gpu-library-advisor-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-nvtx-9-2.
Preparing to unpack .../023-cuda-nvtx-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-nvtx-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-command-line-tools-9-2.
Preparing to unpack .../024-cuda-command-line-tools-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-command-line-tools-9-2 (9.2.88-1) ...
Selecting previously unselected package libxtst6:amd64.
Preparing to unpack .../025-libxtst6_2%3a1.2.3-1_amd64.deb ...
Unpacking libxtst6:amd64 (2:1.2.3-1) ...
Selecting previously unselected package openjdk-11-jre:amd64.
Preparing to unpack .../026-openjdk-11-jre_11.0.11+9-0ubuntu2~18.04_amd64.deb ...
Unpacking openjdk-11-jre:amd64 (11.0.11+9-0ubuntu2~18.04) ...
Selecting previously unselected package default-jre.
Preparing to unpack .../027-default-jre_2%3a1.11-68ubuntu1~18.04.1_amd64.deb ...
```

```
Unpacking default-jre (2:1.11-68ubuntu1~18.04.1) ...
Selecting previously unselected package cuda-nsight-9-2.
Preparing to unpack .../028-cuda-nsight-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-nsight-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-nvvp-9-2.
Preparing to unpack .../029-cuda-nvvp-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-nvvp-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-nvrtc-9-2.
Preparing to unpack .../030-cuda-nvrtc-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-nvrtc-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-nvrtc-dev-9-2.
Preparing to unpack .../031-cuda-nvrtc-dev-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-nvrtc-dev-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-cusolver-9-2.
Preparing to unpack .../032-cuda-cusolver-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-cusolver-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-cusolver-dev-9-2.
Preparing to unpack .../033-cuda-cusolver-dev-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-cusolver-dev-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-cublas-9-2.
Preparing to unpack .../034-cuda-cublas-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-cublas-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-cublas-dev-9-2.
Preparing to unpack .../035-cuda-cublas-dev-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-cublas-dev-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-cufft-9-2.
Preparing to unpack .../036-cuda-cufft-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-cufft-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-cufft-dev-9-2.
Preparing to unpack .../037-cuda-cufft-dev-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-cufft-dev-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-curand-9-2.
Preparing to unpack .../038-cuda-curand-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-curand-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-curand-dev-9-2.
Preparing to unpack .../039-cuda-curand-dev-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-curand-dev-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-cusparse-9-2.
Preparing to unpack .../040-cuda-cusparse-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-cusparse-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-cusparse-dev-9-2.
Preparing to unpack .../041-cuda-cusparse-dev-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-cusparse-dev-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-npp-9-2.
Preparing to unpack .../042-cuda-npp-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-npp-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-npp-dev-9-2.
Preparing to unpack .../043-cuda-npp-dev-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-npp-dev-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-nvml-dev-9-2.
Preparing to unpack .../044-cuda-nvml-dev-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-nvml-dev-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-nvgraph-9-2.
Preparing to unpack .../045-cuda-nvgraph-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-nvgraph-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-nvgraph-dev-9-2.
Preparing to unpack .../046-cuda-nvgraph-dev-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-nvgraph-dev-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-visual-tools-9-2.
Preparing to unpack .../047-cuda-visual-tools-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-visual-tools-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-tools-9-2.
Preparing to unpack .../048-cuda-tools-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-tools-9-2 (9.2.88-1) ...
Selecting previously unselected package freeglut3:amd64.
Preparing to unpack .../049-freeglut3_2.8.1-3_amd64.deb ...
Unpacking freeglut3:amd64 (2.8.1-3) ...
Selecting previously unselected package freeglut3-dev:amd64.
Preparing to unpack .../050-freeglut3-dev_2.8.1-3_amd64.deb ...
Unpacking freeglut3-dev:amd64 (2.8.1-3) ...
Selecting previously unselected package libxmu-headers.
Preparing to unpack .../051-libxmu-headers_2%3a1.1.2-2_all.deb ...
Unpacking libxmu-headers (2:1.1.2-2) ...
Selecting previously unselected package libxmu-dev:amd64.
Preparing to unpack .../052-libxmu-dev_2%3a1.1.2-2_amd64.deb ...
Unpacking libxmu-dev:amd64 (2:1.1.2-2) ...
Selecting previously unselected package libxi-dev:amd64.
Preparing to unpack .../053-libxi-dev_2%3a1.7.9-1_amd64.deb ...
Unpacking libxi-dev:amd64 (2:1.7.9-1) ...
Selecting previously unselected package cuda-samples-9-2.
Preparing to unpack .../054-cuda-samples-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-samples-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-documentation-9-2.
```

```
      Preparing to unpack .../055-cuda-documentation-9-2_9.2.88-1_amd64.deb ...
      Unpacking cuda-documentation-9-2 (9.2.88-1) ...
      Selecting previously unselected package cuda-libraries-dev-9-2.
      Preparing to unpack .../056-cuda-libraries-dev-9-2_9.2.88-1_amd64.deb ...
      Unpacking cuda-libraries-dev-9-2 (9.2.88-1) ...
      Selecting previously unselected package cuda-toolkit-9-2.
      Preparing to unpack .../057-cuda-toolkit-9-2_9.2.88-1_amd64.deb ...
      Unpacking cuda-toolkit-9-2 (9.2.88-1) ...
      Selecting previously unselected package libnvidia-common-495.
      Preparing to unpack .../058-libnvidia-common-495_495.44-0ubuntu0.18.04.1_all.deb ...
      Unpacking libnvidia-common-495 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package libnvidia-compute-495:amd64.
      Preparing to unpack .../059-libnvidia-compute-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking libnvidia-compute-495:amd64 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package libnvidia-decode-495:amd64.
      Preparing to unpack .../060-libnvidia-decode-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking libnvidia-decode-495:amd64 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package libnvidia-encode-495:amd64.
      Preparing to unpack .../061-libnvidia-encode-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking libnvidia-encode-495:amd64 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package libnvidia-fbc1-495:amd64.
      Preparing to unpack .../062-libnvidia-fbc1-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking libnvidia-fbc1-495:amd64 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package libnvidia-gl-495:amd64.
      Preparing to unpack .../063-libnvidia-gl-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking libnvidia-gl-495:amd64 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package nvidia-compute-utils-495.
      Preparing to unpack .../064-nvidia-compute-utils-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking nvidia-compute-utils-495 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package dkms.
      Preparing to unpack .../065-dkms_2.3-3ubuntu9.7_all.deb ...
      Unpacking dkms (2.3-3ubuntu9.7) ...
      Selecting previously unselected package nvidia-kernel-source-495.
      Preparing to unpack .../066-nvidia-kernel-source-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking nvidia-kernel-source-495 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package nvidia-kernel-common-495.
      Preparing to unpack .../067-nvidia-kernel-common-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking nvidia-kernel-common-495 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package nvidia-dkms-495.
      Preparing to unpack .../068-nvidia-dkms-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking nvidia-dkms-495 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package libnvidia-extra-495:amd64.
      Preparing to unpack .../069-libnvidia-extra-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking libnvidia-extra-495:amd64 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package nvidia-utils-495.
      Preparing to unpack .../070-nvidia-utils-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking nvidia-utils-495 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package libnvidia-cfg1-495:amd64.
      Preparing to unpack .../071-libnvidia-cfg1-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking libnvidia-cfg1-495:amd64 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package libxkbfile1:amd64.
      Preparing to unpack .../072-libxkbfile1_1%3a1.0.9-2_amd64.deb ...
      Unpacking libxkbfile1:amd64 (1:1.0.9-2) ...
      Selecting previously unselected package x11-xkb-utils.
      Preparing to unpack .../073-x11-xkb-utils_7.7+3ubuntu0.18.04.1_amd64.deb ...
      Unpacking x11-xkb-utils (7.7+3ubuntu0.18.04.1) ...
      Selecting previously unselected package xserver-common.
      Preparing to unpack .../074-xserver-common_2%3a1.19.6-1ubuntu4.9_all.deb ...
      Unpacking xserver-common (2:1.19.6-1ubuntu4.9) ...
      Selecting previously unselected package libfontenc1:amd64.
      Preparing to unpack .../075-libfontenc1_1%3a1.1.3-1_amd64.deb ...
      Unpacking libfontenc1:amd64 (1:1.1.3-1) ...
      Selecting previously unselected package libxfont2:amd64.
      Preparing to unpack .../076-libxfont2_1%3a2.0.3-1_amd64.deb ...
      Unpacking libxfont2:amd64 (1:2.0.3-1) ...
      Selecting previously unselected package xserver-xorg-core-hwe-18.04.
      Preparing to unpack .../077-xserver-xorg-core-hwe-18.04_2%3a1.20.8-2ubuntu2.2~18.04.5_amd64.deb ...
      Unpacking xserver-xorg-core-hwe-18.04 (2:1.20.8-2ubuntu2.2~18.04.5) ...
      Selecting previously unselected package xserver-xorg-video-nvidia-495.
      Preparing to unpack .../078-xserver-xorg-video-nvidia-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking xserver-xorg-video-nvidia-495 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package nvidia-driver-495.
      Preparing to unpack .../079-nvidia-driver-495_495.44-0ubuntu0.18.04.1_amd64.deb ...
      Unpacking nvidia-driver-495 (495.44-0ubuntu0.18.04.1) ...
      Selecting previously unselected package nvidia-modprobe.
      Preparing to unpack .../080-nvidia-modprobe_495.29.05-0ubuntu1_amd64.deb ...
      Unpacking nvidia-modprobe (495.29.05-0ubuntu1) ...
      Selecting previously unselected package python3-xkit.
      Preparing to unpack .../081-python3-xkit_0.5.0ubuntu2_all.deb ...
      Unpacking python3-xkit (0.5.0ubuntu2) ...
      Selecting previously unselected package libpolkit-agent-1-0:amd64.
      Preparing to unpack .../082-libpolkit-agent-1-0_0.105-20ubuntu0.18.04.5_amd64.deb ...
      Unpacking libpolkit-agent-1-0:amd64 (0.105-20ubuntu0.18.04.5) ...
```

```
Selecting previously unselected package libpolkit-backend-1-0:amd64.
Preparing to unpack .../083-libpolkit-backend-1-0_0.105-20ubuntu0.18.04.5_amd64.deb ...
Unpacking libpolkit-backend-1-0:amd64 (0.105-20ubuntu0.18.04.5) ...
Selecting previously unselected package policykit-1.
Preparing to unpack .../084-policykit-1_0.105-20ubuntu0.18.04.5_amd64.deb ...
Unpacking policykit-1 (0.105-20ubuntu0.18.04.5) ...
Selecting previously unselected package policykit-1-gnome.
Preparing to unpack .../085-policykit-1-gnome_0.105-6ubuntu2_amd64.deb ...
Unpacking policykit-1-gnome (0.105-6ubuntu2) ...
Selecting previously unselected package screen-resolution-extra.
Preparing to unpack .../086-screen-resolution-extra_0.17.3_all.deb ...
Unpacking screen-resolution-extra (0.17.3) ...
Selecting previously unselected package libjansson4:amd64.
Preparing to unpack .../087-libjansson4_2.11-1_amd64.deb ...
Unpacking libjansson4:amd64 (2.11-1) ...
Selecting previously unselected package libxnvctrl0:amd64.
Preparing to unpack .../088-libxnvctrl0_495.29.05-0ubuntu1_amd64.deb ...
Unpacking libxnvctrl0:amd64 (495.29.05-0ubuntu1) ...
Selecting previously unselected package nvidia-settings.
Preparing to unpack .../089-nvidia-settings_495.29.05-0ubuntu1_amd64.deb ...
Unpacking nvidia-settings (495.29.05-0ubuntu1) ...
Selecting previously unselected package cuda-drivers-495.
Preparing to unpack .../090-cuda-drivers-495_495.29.05-1_amd64.deb ...
Unpacking cuda-drivers-495 (495.29.05-1) ...
Selecting previously unselected package cuda-drivers.
Preparing to unpack .../091-cuda-drivers_495.29.05-1_amd64.deb ...
Unpacking cuda-drivers (495.29.05-1) ...
Selecting previously unselected package cuda-libraries-9-2.
Preparing to unpack .../092-cuda-libraries-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-libraries-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-runtime-9-2.
Preparing to unpack .../093-cuda-runtime-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-runtime-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-demo-suite-9-2.
Preparing to unpack .../094-cuda-demo-suite-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-demo-suite-9-2 (9.2.88-1) ...
Selecting previously unselected package cuda-9-2.
Preparing to unpack .../095-cuda-9-2_9.2.88-1_amd64.deb ...
Unpacking cuda-9-2 (9.2.88-1) ...
Selecting previously unselected package libfakeroot:amd64.
Preparing to unpack .../096-libfakeroot_1.22-2ubuntu1_amd64.deb ...
Unpacking libfakeroot:amd64 (1.22-2ubuntu1) ...
Selecting previously unselected package fakeroot.
Preparing to unpack .../097-fakeroot_1.22-2ubuntu1_amd64.deb ...
Unpacking fakeroot (1.22-2ubuntu1) ...
Selecting previously unselected package fonts-dejavu-core.
Preparing to unpack .../098-fonts-dejavu-core_2.37-1_all.deb ...
Unpacking fonts-dejavu-core (2.37-1) ...
Selecting previously unselected package fonts-dejavu-extra.
Preparing to unpack .../099-fonts-dejavu-extra_2.37-1_all.deb ...
Unpacking fonts-dejavu-extra (2.37-1) ...
Selecting previously unselected package x11-utils.
Preparing to unpack .../100-x11-utils_7.7+3build1_amd64.deb ...
Unpacking x11-utils (7.7+3build1) ...
Selecting previously unselected package libatk-wrapper-java.
Preparing to unpack .../101-libatk-wrapper-java_0.33.3-20ubuntu0.1_all.deb ...
Unpacking libatk-wrapper-java (0.33.3-20ubuntu0.1) ...
Selecting previously unselected package libatk-wrapper-java-jni:amd64.
Preparing to unpack .../102-libatk-wrapper-java-jni_0.33.3-20ubuntu0.1_amd64.deb ...
Unpacking libatk-wrapper-java-jni:amd64 (0.33.3-20ubuntu0.1) ...
Selecting previously unselected package nvidia-prime.
Preparing to unpack .../103-nvidia-prime_0.8.16~0.18.04.1_all.deb ...
Unpacking nvidia-prime (0.8.16~0.18.04.1) ...
Selecting previously unselected package xfonts-encodings.
Preparing to unpack .../104-xfonts-encodings_1%3a1.0.4-2_all.deb ...
Unpacking xfonts-encodings (1:1.0.4-2) ...
Selecting previously unselected package xfonts-utils.
Preparing to unpack .../105-xfonts-utils_1%3a7.7+6_amd64.deb ...
Unpacking xfonts-utils (1:7.7+6) ...
Selecting previously unselected package xfonts-base.
Preparing to unpack .../106-xfonts-base_1%3a1.0.4+nmu1_all.deb ...
Unpacking xfonts-base (1:1.0.4+nmu1) ...
Setting up libxkbfile1:amd64 (1:1.0.9-2) ...
Setting up libnss-systemd:amd64 (237-3ubuntu10.52) ...
First installation detected...
Checking NSS setup...
Setting up freeglut3:amd64 (2.8.1-3) ...
Setting up keyboard-configuration (1.178ubuntu2.9) ...
Your console font configuration will be updated the next time your system
boots. If you want to update it now, run 'setupcon' from a virtual console.
Setting up nvidia-prime (0.8.16~0.18.04.1) ...
Setting up libnvidia-common-495 (495.44-0ubuntu0.18.04.1) ...
Setting up x11-xkb-utils (7.7+3ubuntu0.18.04.1) ...
```

```
Setting up fonts-dejavu-core (2.37-1) ...
Setting up systemd-sysv (237-3ubuntu10.52) ...
Setting up libnvidia-gl-495:amd64 (495.44-0ubuntu0.18.04.1) ...
Setting up libxmu-headers (2:1.1.2-2) ...
Setting up libnvidia-compute-495:amd64 (495.44-0ubuntu0.18.04.1) ...
Setting up libjansson4:amd64 (2.11-1) ...
Setting up libnvidia-fbc1-495:amd64 (495.44-0ubuntu0.18.04.1) ...
Setting up cuda-license-9-2 (9.2.88-1) ...
*** LICENSE AGREEMENT ***
By using this software you agree to fully comply with the terms and
conditions of the EULA (End User License Agreement). The EULA is located
at /usr/local/cuda-9.2/doc/EULA.txt. The EULA can also be found at
http://docs.nvidia.com/cuda/eula/index.html. If you do not agree to the
terms and conditions of the EULA, do not use the software.

Setting up libnvidia-extra-495:amd64 (495.44-0ubuntu0.18.04.1) ...
Setting up xfonts-encodings (1:1.0.4-2) ...
Setting up libxtst6:amd64 (2:1.2.3-1) ...
Setting up cuda-nvprune-9-2 (9.2.88-1) ...
Setting up libnvidia-cfg1-495:amd64 (495.44-0ubuntu0.18.04.1) ...
Setting up dkms (2.3-3ubuntu9.7) ...
Setting up libxxf86dga1:amd64 (2:1.1.4-1) ...
Setting up udev (237-3ubuntu10.52) ...
invoke-rc.d: could not determine current runlevel
invoke-rc.d: policy-rc.d denied execution of restart.
Setting up cuda-cudart-9-2 (9.2.88-1) ...
Setting up libfakeroot:amd64 (1.22-2ubuntu1) ...
Setting up nvidia-modprobe (495.29.05-0ubuntu1) ...
Setting up cuda-nvprof-9-2 (9.2.88-1) ...
Setting up cuda-nvrtc-9-2 (9.2.88-1) ...
Setting up cuda-nvtx-9-2 (9.2.88-1) ...
Setting up libfontenc1:amd64 (1:1.1.3-1) ...
Setting up dmsetup (2:1.02.145-4.1ubuntu3.18.04.3) ...
Setting up nvidia-utils-495 (495.44-0ubuntu0.18.04.1) ...
Setting up libxi-dev:amd64 (2:1.7.9-1) ...
Setting up nvidia-kernel-common-495 (495.44-0ubuntu0.18.04.1) ...
Created symlink /etc/systemd/system/systemd-hibernate.service.requires/nvidia-hibernate.service → /lib/systemd/sy
stem/nvidia-hibernate.service.
Created symlink /etc/systemd/system/systemd-suspend.service.requires/nvidia-resume.service → /lib/systemd/system/
nvidia-resume.service.
Created symlink /etc/systemd/system/systemd-hibernate.service.requires/nvidia-resume.service → /lib/systemd/syste
m/nvidia-resume.service.
Created symlink /etc/systemd/system/systemd-suspend.service.requires/nvidia-suspend.service → /lib/systemd/system
/nvidia-suspend.service.
Setting up cuda-cusolver-9-2 (9.2.88-1) ...
Setting up fonts-dejavu-extra (2.37-1) ...
Setting up cuda-nvml-dev-9-2 (9.2.88-1) ...
Setting up freeglut3-dev:amd64 (2.8.1-3) ...
Setting up libxnvctrl0:amd64 (495.29.05-0ubuntu1) ...
Setting up cuda-cufft-9-2 (9.2.88-1) ...
Setting up nvidia-kernel-source-495 (495.44-0ubuntu0.18.04.1) ...
Setting up networkd-dispatcher (1.7-0ubuntu3.3) ...
Created symlink /etc/systemd/system/multi-user.target.wants/networkd-dispatcher.service → /lib/systemd/system/net
workd-dispatcher.service.
Setting up libpolkit-gobject-1-0:amd64 (0.105-20ubuntu0.18.04.5) ...
Setting up python3-xkit (0.5.0ubuntu2) ...
Setting up openjdk-11-jre:amd64 (11.0.11+9-0ubuntu2~18.04) ...
Setting up cuda-npp-9-2 (9.2.88-1) ...
Setting up nvidia-dkms-495 (495.44-0ubuntu0.18.04.1) ...
Loading new nvidia-495.44 DKMS files...
It is likely that 5.4.104+ belongs to a chroot's host
Building for 4.15.0-162-generic
Building for architecture x86_64
Building initial module for 4.15.0-162-generic
Done.

nvidia:
Running module version sanity check.
 - Original module
   - No original module exists within this kernel
 - Installation
   - Installing to /lib/modules/4.15.0-162-generic/updates/dkms/

nvidia-modeset.ko:
Running module version sanity check.
 - Original module
   - No original module exists within this kernel
 - Installation
   - Installing to /lib/modules/4.15.0-162-generic/updates/dkms/

nvidia-drm.ko:
Running module version sanity check.
 - Original module
```

```
      - No original module exists within this kernel
  - Installation
    - Installing to /lib/modules/4.15.0-162-generic/updates/dkms/

nvidia-uvm.ko:
Running module version sanity check.
  - Original module
    - No original module exists within this kernel
  - Installation
    - Installing to /lib/modules/4.15.0-162-generic/updates/dkms/

nvidia-peermem.ko:
Running module version sanity check.
  - Original module
    - No original module exists within this kernel
  - Installation
    - Installing to /lib/modules/4.15.0-162-generic/updates/dkms/

depmod...


DKMS: install completed.
Setting up cuda-misc-headers-9-2 (9.2.88-1) ...
Setting up cuda-memcheck-9-2 (9.2.88-1) ...
Setting up cuda-npp-dev-9-2 (9.2.88-1) ...
Setting up xserver-common (2:1.19.6-1ubuntu4.9) ...
Setting up cuda-nvdisasm-9-2 (9.2.88-1) ...
Setting up nvidia-compute-utils-495 (495.44-0ubuntu0.18.04.1) ...
Warning: The home dir /nonexistent you specified can't be accessed: No such file or directory
Adding system user `nvidia-persistenced' (UID 104) ...
Adding new group `nvidia-persistenced' (GID 108) ...
Adding new user `nvidia-persistenced' (UID 104) with group `nvidia-persistenced' ...
Not creating home directory `/nonexistent'.
Setting up libpam-systemd:amd64 (237-3ubuntu10.52) ...
Setting up cuda-nvrtc-dev-9-2 (9.2.88-1) ...
Setting up cuda-driver-dev-9-2 (9.2.88-1) ...
Setting up cuda-curand-9-2 (9.2.88-1) ...
Setting up cuda-cusolver-dev-9-2 (9.2.88-1) ...
Setting up libxmu-dev:amd64 (2:1.1.2-2) ...
Setting up libpolkit-agent-1-0:amd64 (0.105-20ubuntu0.18.04.5) ...
Setting up default-jre (2:1.11-68ubuntu1~18.04.1) ...
Setting up libnvidia-decode-495:amd64 (495.44-0ubuntu0.18.04.1) ...
Setting up cuda-nsight-9-2 (9.2.88-1) ...
Setting up cuda-cublas-9-2 (9.2.88-1) ...
Setting up cuda-cuobjdump-9-2 (9.2.88-1) ...
Setting up x11-utils (7.7+3build1) ...
Setting up cuda-cusparse-9-2 (9.2.88-1) ...
Setting up libxfont2:amd64 (1:2.0.3-1) ...
Setting up cuda-nvgraph-9-2 (9.2.88-1) ...
Setting up xfonts-utils (1:7.7+6) ...
Setting up cuda-gpu-library-advisor-9-2 (9.2.88-1) ...
Setting up fakeroot (1.22-2ubuntu1) ...
update-alternatives: using /usr/bin/fakeroot-sysv to provide /usr/bin/fakeroot (fakeroot) in auto mode
Setting up cuda-gdb-9-2 (9.2.88-1) ...
Setting up libpolkit-backend-1-0:amd64 (0.105-20ubuntu0.18.04.5) ...
Setting up cuda-cudart-dev-9-2 (9.2.88-1) ...
Setting up cuda-cufft-dev-9-2 (9.2.88-1) ...
Setting up cuda-libraries-9-2 (9.2.88-1) ...
Setting up cuda-cusparse-dev-9-2 (9.2.88-1) ...
Setting up cuda-nvcc-9-2 (9.2.88-1) ...
Setting up libatk-wrapper-java (0.33.3-20ubuntu0.1) ...
Setting up xserver-xorg-core-hwe-18.04 (2:1.20.8-2ubuntu2.2~18.04.5) ...
Setting up cuda-cupti-9-2 (9.2.88-1) ...
Setting up cuda-cublas-dev-9-2 (9.2.88-1) ...
Setting up xfonts-base (1:1.0.4+nmu1) ...
Setting up cuda-nvgraph-dev-9-2 (9.2.88-1) ...
Setting up libnvidia-encode-495:amd64 (495.44-0ubuntu0.18.04.1) ...
Setting up cuda-command-line-tools-9-2 (9.2.88-1) ...
Setting up cuda-curand-dev-9-2 (9.2.88-1) ...
Setting up cuda-nvvp-9-2 (9.2.88-1) ...
Setting up policykit-1 (0.105-20ubuntu0.18.04.5) ...
Setting up cuda-visual-tools-9-2 (9.2.88-1) ...
Setting up xserver-xorg-video-nvidia-495 (495.44-0ubuntu0.18.04.1) ...
Setting up cuda-compiler-9-2 (9.2.88-1) ...
Setting up libatk-wrapper-java-jni:amd64 (0.33.3-20ubuntu0.1) ...
Setting up policykit-1-gnome (0.105-6ubuntu2) ...
Setting up screen-resolution-extra (0.17.3) ...
Setting up cuda-libraries-dev-9-2 (9.2.88-1) ...
Setting up cuda-samples-9-2 (9.2.88-1) ...
Setting up cuda-documentation-9-2 (9.2.88-1) ...
Setting up cuda-tools-9-2 (9.2.88-1) ...
Setting up cuda-toolkit-9-2 (9.2.88-1) ...
Setting up nvidia-driver-495 (495.44-0ubuntu0.18.04.1) ...
Setting up nvidia-settings (495.29.05-0ubuntu1) ...
```

```
Setting up cuda-drivers-495 (495.29.05-1) ...
Setting up cuda-drivers (495.29.05-1) ...
Setting up cuda-runtime-9-2 (9.2.88-1) ...
Setting up cuda-demo-suite-9-2 (9.2.88-1) ...
Setting up cuda-9-2 (9.2.88-1) ...
Processing triggers for systemd (237-3ubuntu10.52) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for dbus (1.12.2-1ubuntu1.2) ...
Processing triggers for hicolor-icon-theme (0.17-2) ...
Processing triggers for fontconfig (2.12.6-0ubuntu2) ...
Processing triggers for mime-support (3.60ubuntu1) ...
Processing triggers for libc-bin (2.27-3ubuntu1.3) ...
/sbin/ldconfig.real: /usr/local/lib/python3.7/dist-packages/ideep4py/lib/libmkldnn.so.0 is not a symbolic link
```

In [ ]:
```
!nvcc --version
```

```
nvcc: NVIDIA (R) Cuda compiler driver
Copyright (c) 2005-2018 NVIDIA Corporation
Built on Wed_Apr_11_23:16:29_CDT_2018
Cuda compilation tools, release 9.2, V9.2.88
```

In [ ]:
```
!pip install git+git://github.com/andreinechaev/nvcc4jupyter.git
```

```
Collecting git+git://github.com/andreinechaev/nvcc4jupyter.git
  Cloning git://github.com/andreinechaev/nvcc4jupyter.git to /tmp/pip-req-build-9dtkx8l1
  Running command git clone -q git://github.com/andreinechaev/nvcc4jupyter.git /tmp/pip-req-build-9dtkx8l1
Building wheels for collected packages: NVCCPlugin
  Building wheel for NVCCPlugin (setup.py) ... done
  Created wheel for NVCCPlugin: filename=NVCCPlugin-0.0.2-py3-none-any.whl size=4305 sha256=1b600cb5136f593b5a106
24d163222dc5eed5ef0d243cad9db82fc92f075294f
  Stored in directory: /tmp/pip-ephem-wheel-cache-hdmc37yh/wheels/c5/2b/c0/87008e795a14bbcdfc7c846a00d06981916331
eb980b6c8bdf
Successfully built NVCCPlugin
Installing collected packages: NVCCPlugin
Successfully installed NVCCPlugin-0.0.2
```

In [ ]:
```
%load_ext nvcc_plugin
```

```
created output directory at /content/src
Out bin /content/result.out
```

RUNLENGTH ENCODING CONCURRENTLY ON MULTI–CORE

pppppppppppppppppppppppppppppppppppppppppppppppppppppppppppppppppppppppppppppppppggggggggggggggggggggggggggggggggggggggggggggggggMMMMMMM

In [ ]:
```
%%cu
#include <iostream>
#include <cstring>
#include <fstream>
using namespace std;

__global__ void RunLengthEncodingComputation (char *orig, int *_encost, int n) {
    int index = ( (blockIdx.x * blockDim.x) + threadIdx.x );
    index <<= 7;

    if(orig[index] == orig[index-1]){
        while(index < n && orig[index] == orig[index-1] )
            ++index;
    }

    for (int i = index; i < fminf(index + 128, n); )
    {
        char temp = orig[i];
        int t_ = i;
        while (i < n && temp == orig[i])
            ++i;
        _encost[t_] = i;
    }
}

int main()  {
```

```
        int n=400;
        char *s = new char[n];
        int i = 0;
        string input;
        ifstream MyReadFile("input.txt");
        getline (MyReadFile, input);
        strcpy(s,input.c_str());
        s[400]='\0';
        char *cudas;
        int *_encost, *_inter = new int[n];

        int threads = 4;
        int blocks = 1;
        cudaMalloc (&cudas, n*sizeof(char));
        cudaMalloc (&_encost, n*sizeof(int));

        cudaMemcpy (cudas, s, n*sizeof(char), cudaMemcpyHostToDevice);

        RunLengthEncodingComputation <<<blocks, threads>>> (cudas, _encost, n);
        cudaDeviceSynchronize();
        cudaMemcpy(_inter, _encost, n*sizeof(int), cudaMemcpyDeviceToHost);

        string ans;
        int sum = 0;
        for(int i = 0; i < n; i = _inter[i]) {
            ans += s[i] + to_string(_inter[i]-i);
            sum += _inter[i]-i;
        }
        cout<<"Output:\n";
        cout << ans << endl;
}
```

Output:
p62g44M18y49l27p62g44M18y49l27