

Containers: How can I use GPUs with Bright Deep learning stack?

This is a Dockerfile that can be used to create a Bright Deep Learning Docker image. Once instantiated using the nvidia-docker command, applications running within the container will have access to the GPU. This container is lightweight. While idle, it will use only 8MB of memory.

The Dockerfile

```
FROM centos:latest

ENV CUDA_VERSION 8.0.61
LABEL com.nvidia.cuda.version="{CUDA_VERSION}"
LABEL com.nvidia.volumes.needed="nvidia_driver"
ENV NVIDIA_CUDA_VERSION $CUDA_VERSION
ENV CUDA_PKG_VERSION 8-0-$CUDA_VERSION-1

# nvidia-container-runtime
ENV NVIDIA_VISIBLE_DEVICES all
ENV NVIDIA_DRIVER_CAPABILITIES compute,utility

COPY cm.repo /etc/yum.repos.d/cm.repo
COPY epel-testing.repo /etc/yum.repos.d/epel-testing.repo
COPY epel.repo /etc/yum.repos.d/epel.repo
COPY RPM-GPG-KEY-EPEL-7 /etc/pki/rpm-gpg/RPM-GPG-KEY-EPEL-7
COPY RPM-GPG-KEY-cm /etc/pki/rpm-gpg/RPM-GPG-KEY-cm
COPY http-parser-2.7.1-3.sdl7.x86_64.rpm /root/http-parser-2.7.1-3.sdl7.x86_64.rpm

RUN yum -y install /root/http-parser-2.7.1-3.sdl7.x86_64.rpm environment-modules cm-ml-distdeps

RUN echo 'export MODULEPATH=$MODULEPATH:/cm/shared/modulefiles' >> /root/.bashrc
```

The build directory

```
# ls -l
-rw----- 1 root root 785 Sep 2 13:30 cm.repo
-rw-r--r-- 1 root root 838 Sep 2 13:32 Dockerfile
-rw-r--r-- 1 root root 951 Sep 2 13:31 epel.repo
-rw-r--r-- 1 root root 1050 Sep 2 13:31 epel-testing.repo
-rw-r--r-- 1 root root 30784 Sep 2 13:31 http-parser-2.7.1-3.sdl7.x86_64.rpm
-rw-r--r-- 1 root root 1714 Sep 2 13:31 RPM-GPG-KEY-cm
-rw-r--r-- 1 root root 1662 Sep 2 13:31 RPM-GPG-KEY-EPEL-7
```

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Build the image

```
# docker build -t bright/dl/min/1 .
```

Push the image to the local Docker repository

```
# docker tag bright/dl/min/1 localhost:6000/bright/dl/min/1
# docker push localhost:6000/bright/dl/min/1
```

Run the container

Log into a node that has a GPU then load the CUDA and nvidia-docker modules. Instantiate the container using the 'nvidia-docker' command. The '-v /cm/shared:/cm/shared' argument is required to mount the host:/cm/shared directory inside the container. The Bright Deep Learning stack is installed in /cm/shared.

```
# ssh rstober@gpu01
$ module load cuda80/toolkit nvidia-docker
$ nvidia-docker run -v /cm/shared:/cm/shared -ti virgo-head:6000/bright/dl/min/1
```

The container starts. Load the CUDA and tensorflow modules (inside the container this time) so that you can access the GPU and then run tensorflow.

```
[root@7ca3a4e45601 /]# module load cuda80/toolkit tensorflow
[root@7ca3a4e45601 /]# nvidia-smi
Sat Sep  2 22:23:06 2017
+-----+
+-----+
| NVIDIA-SMI 375.66                Driver Version: 375.66
|
+-----+-----+-----+-----+
+-----+
| GPU   Name           Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf    Pwr:Usage/Cap|      Memory-Usage | GPU-Util  Compute M. |
+-----+-----+-----+-----+

```

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```
|=====+=====+=====
=====|
| 0 Quadro K6000 Off | 0000:82:00.0 Off |
| 0 |
| 26% 36C P8 20W / 225W | 0MiB / 11439MiB | 0%
Default |
+-----+-----+-----
-----+
+-----+
| Processes: GPU
Memory | GPU
| GPU PID Type Process name Usa
ge |
|=====+=====+=====
=====|
| No running processes found
|
+-----+-----+-----
-----+
```

Now that we know we can see the GPU, we're ready to run Tensorflow.

```
[root@7ca3a4e45601 /]# python /cm/shared/apps/dl/tensorflow-scripts/co
mp-graph.py
I tensorflow/core/common_runtime/gpu/gpu_device.cc:885] Found device 0
with properties:
name: Quadro K6000
major: 3 minor: 5 memoryClockRate (GHz) 0.9015
pciBusID 0000:82:00.0
Total memory: 11.17GiB
Free memory: 11.10GiB
I tensorflow/core/common_runtime/gpu/gpu_device.cc:906] DMA: 0
I tensorflow/core/common_runtime/gpu/gpu_device.cc:916] 0: Y
I tensorflow/core/common_runtime/gpu/gpu_device.cc:975] Creating Tens
orFlow device (/gpu:0) -> (device: 0, name: Quadro K6000, pci bus id: 0
000:82:00.0)
[3.0, 4.0]
('node3:', <tf.Tensor 'Add:0' shape=() dtype=float32>)
('sess.run(node3):', 7.0)
```

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Unique solution ID: #1383

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