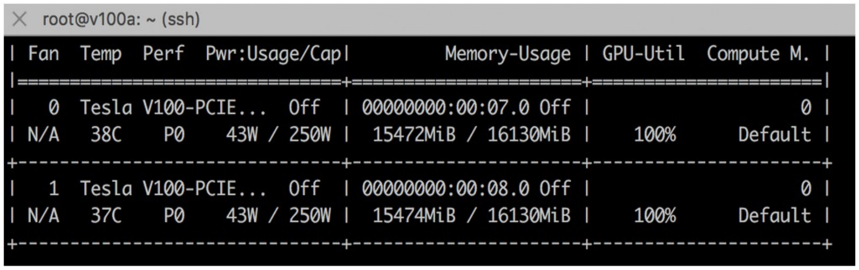
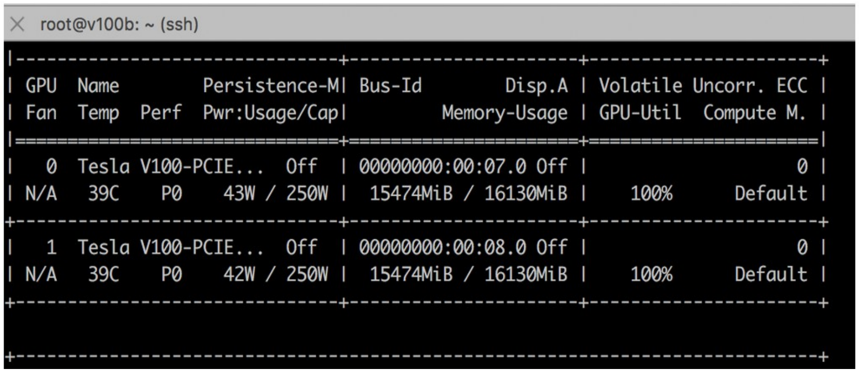
- How long does it take to complete the training run? (hint: this session is on distributed training, so it *will* take a while)
    - 19 hours and 36 mins
- Do you think your model is fully trained? How can you tell?
    - I think yes, because the training loss chart is almost a flat line
- Were you overfitting?
    - **Overfitting** if: training loss << eval loss**, Underfitting** if: training loss >> eval loss**, Just right** if eval loss ~ validation loss. To me both eval loss and training loss has the same shape, so we don't have overfitting.
- Were your GPUs fully utilized?
    - yes



root@v100a: ~ (ssh)

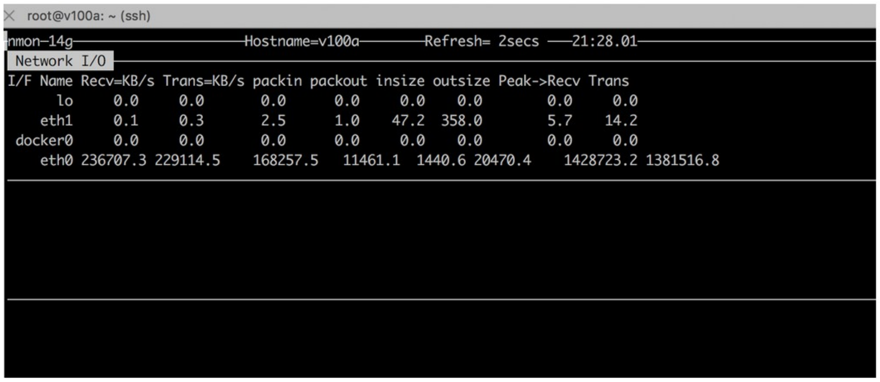
```
| Fan  Temp  Perf  Pwr:Usage/Cap|         Memory-Usage | GPU-Util  Compute M. |
|===============================+======================+======================|
|   0  Tesla V100-PCIE...  Off  | 00000000:00:07.0 Off |                    0 |
| N/A   38C    P0    43W / 250W |  15472MiB / 16130MiB |    100%      Default |
+-------------------------------+----------------------+----------------------+
|   1  Tesla V100-PCIE...  Off  | 00000000:00:08.0 Off |                    0 |
| N/A   37C    P0    43W / 250W |  15474MiB / 16130MiB |    100%      Default |
+-------------------------------+----------------------+----------------------+
```



root@v100b: ~ (ssh)

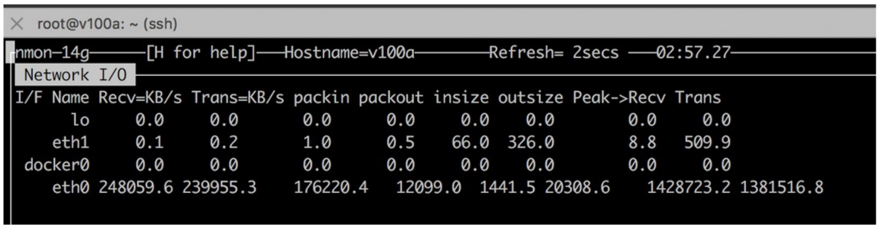
```
|-------------------------------+----------------------+----------------------+
| GPU  Name        Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap|         Memory-Usage | GPU-Util  Compute M. |
|===============================+======================+======================|
|   0  Tesla V100-PCIE...  Off  | 00000000:00:07.0 Off |                    0 |
| N/A   39C    P0    43W / 250W |  15474MiB / 16130MiB |    100%      Default |
+-------------------------------+----------------------+----------------------+
|   1  Tesla V100-PCIE...  Off  | 00000000:00:08.0 Off |                    0 |
| N/A   39C    P0    42W / 250W |  15474MiB / 16130MiB |    100%      Default |
+-------------------------------+----------------------+----------------------+


+-----------------------------------------------------------------------------+
```

- Did you monitor network traffic (hint: `apt install nmon`) ? Was network the bottleneck?
    - yes



root@v100a: ~ (ssh)

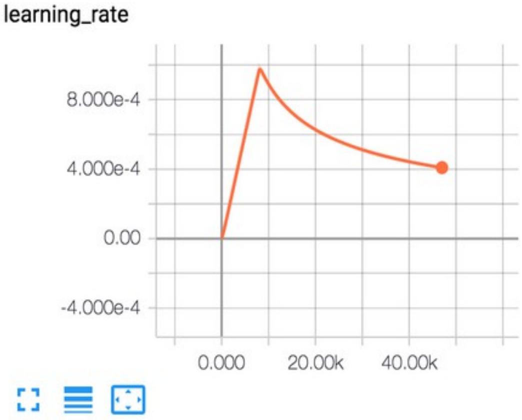
```
nmon—14g——————————————Hostname=v100a————Refresh= 2secs ——21:28.01——————————
 Network I/O
I/F Name Recv=KB/s Trans=KB/s packin packout insize outsize Peak->Recv Trans
      lo     0.0      0.0       0.0      0.0     0.0    0.0        0.0     0.0
    eth1     0.1      0.3       2.5      1.0    47.2  358.0        5.7    14.2
 docker0     0.0      0.0       0.0      0.0     0.0    0.0        0.0     0.0
    eth0 236707.3 229114.5    168257.5   11461.1  1440.6 20470.4    1428723.2 1381516.8
```



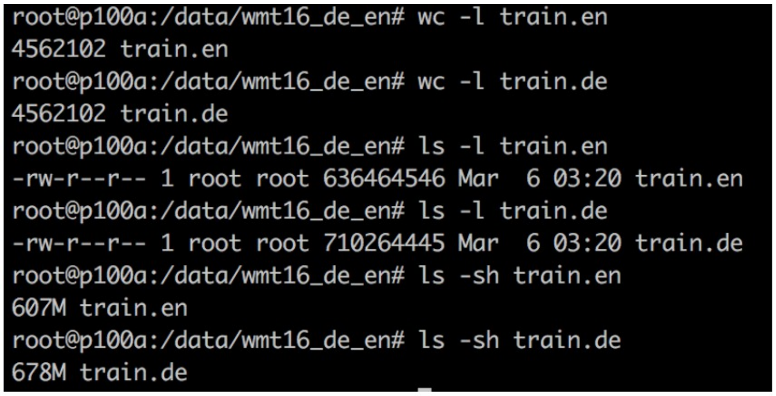
root@v100a: ~ (ssh)

```
nmon—14g————[H for help]——Hostname=v100a————Refresh= 2secs ——02:57.27——————
 Network I/O
I/F Name Recv=KB/s Trans=KB/s packin packout insize outsize Peak->Recv Trans
      lo     0.0      0.0       0.0      0.0     0.0    0.0        0.0     0.0
    eth1     0.1      0.2       1.0      0.5    66.0  326.0        8.8   509.9
 docker0     0.0      0.0       0.0      0.0     0.0    0.0        0.0     0.0
    eth0 248059.6 239955.3    176220.4   12099.0  1441.5 20308.6    1428723.2 1381516.8
```

  - It is not, 1G bandwidth was not fully utilized.
- Take a look at the plot of the learning rate and then check the config file. Can you explain this setting?



  - Learning rate is one of hyperparameters. Warm up steps are 8000, it allows the algorithm to go sharply from 0 to a high value before 8000 steps, then gradually decreases the learning rate to find the optimal value.
- How big was your training set (mb)? How many training lines did it contain?
- (I forgot to check for the qnswer before canceling the vs, recreated a p100 vs to answer this question!)



```
root@p100a:/data/wmt16_de_en# wc -l train.en
4562102 train.en
root@p100a:/data/wmt16_de_en# wc -l train.de
4562102 train.de
root@p100a:/data/wmt16_de_en# ls -l train.en
-rw-r--r-- 1 root root 636464546 Mar  6 03:20 train.en
root@p100a:/data/wmt16_de_en# ls -l train.de
-rw-r--r-- 1 root root 710264445 Mar  6 03:20 train.de
root@p100a:/data/wmt16_de_en# ls -sh train.en
607M train.en
root@p100a:/data/wmt16_de_en# ls -sh train.de
678M train.de
```

- What are the files that a TF checkpoint is comprised of?
    - each checkpoint has a .data, a .meta, and a .index
- How big is your resulting model checkpoint (mb)?
    - ~8M
- Remember the definition of a "step". How long did an average step take?
    - 2.5 sec (total steps were 4600 and run time was 19 hours and 36 minutes)
- How does that correlate with the observed network utilization between nodes?
    - the network utilization is positively correlated with the time required for each step, because with the increase time of communication between notes, it takes more time to complete a step.