Explanations.

-“sinfo” used to see partition of system like CPU(n), Root and their information such as its timelimit, nodes, nodelist and state.

-“squeue” shows the schedule of jobs with their JobID, its partition, issuer, time it is taking, its node.

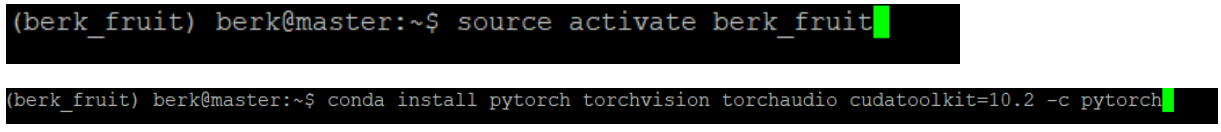
-“sbatch” is used to submit jobs on Cluster via SLURM such as given Sbatch script at the end of exercise sheet.

-“sshare -all” shows which type of account a user has and his/her usage information such as EffectvUsage. Also, computation share can be seen with this command.

Tasks related to this tutorial with screenshots.

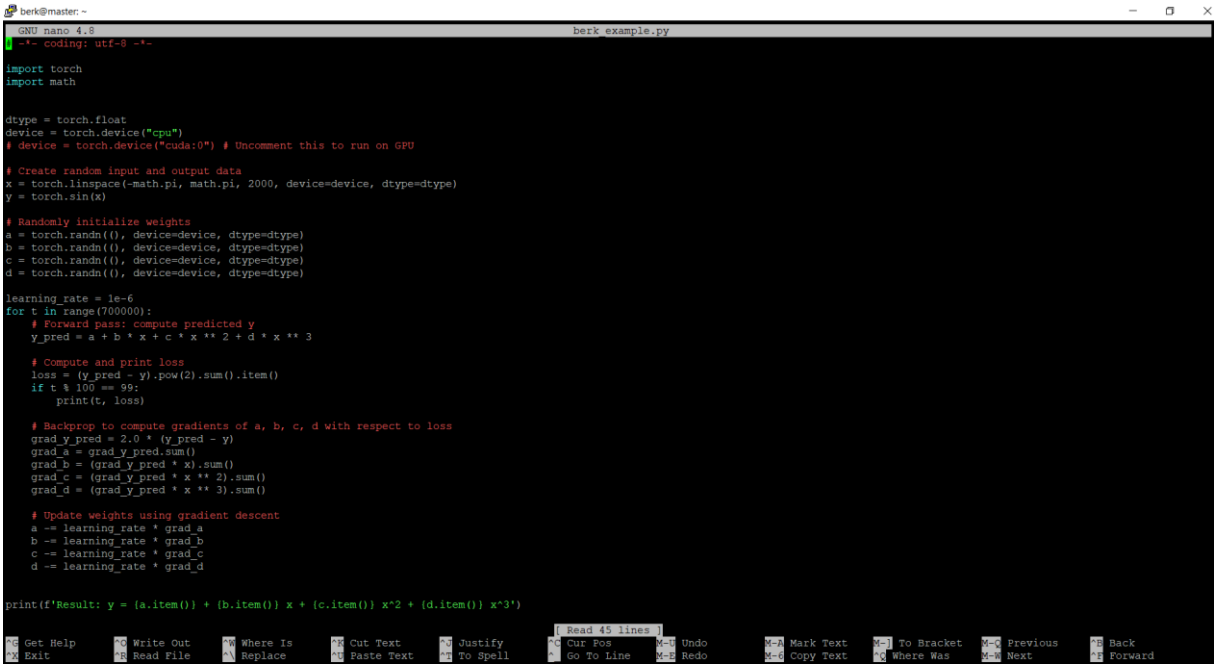
Creating a conda environment and installing PyTorch library and dependencies.

Activating the environment



Let's put a neural network example from PyTorch website in a berk_example.py

```
(berk_fruit) berk@master:~$ nano berk_example.py
```



Now modifying the sbatch script given in the exercise sheet

berk@master: ~

```
(berk_fruit) berk@master:~$ nano bashme.sh
```

berk@master: ~

```
  GNU nano 4.8                                                    bashme.sh
#!/usr/bin/env bash
#SBATCH --job-name=TEST1
#SBATCH --output=TEST_%j.log
#SBATCH --partition=STUD
#SBATCH --gres=gpu:1

set -e
source /home/berk/anaconda3/bin/activate /home/berk/anaconda3/envs/berk_fruit
cd $PWD
srun /home/berk/anaconda3/envs/berk_fruit/bin/python3 berk_example.py
```

```
(berk_fruit) berk@master:~$ cat bashme.sh
#!/usr/bin/env bash
#SBATCH --job-name=TEST1
#SBATCH --output=TEST_%j.log
#SBATCH --partition=STUD
#SBATCH --gres=gpu:1

set -e
source /home/berk/anaconda3/bin/activate /home/berk/anaconda3/envs/berk_fruit
cd $PWD
srun /home/berk/anaconda3/envs/berk_fruit/bin/python3 berk_example.py
```

Submitting the job - Here we see TEST_327048.log

```
berk@master:~$ sbatch bashme.sh
Submitted batch job 327048
```

```
berk@master:~$ ls
anaconda3  Anaconda3-5.3.1-Linux-x86_64.sh  bashme.sh  berk_example.py  lab_doc.txt  TEST_327048.log
```

Training error of the output .log (last part because cat TEST_327048.log is too long to show)

berk@master: ~

```
berk@master:~$ tail -f TEST_327048.log
699199 8.817167282104492
699299 8.817167282104492
699399 8.817167282104492
699499 8.817167282104492
699599 8.817167282104492
699699 8.817167282104492
699799 8.817167282104492
699899 8.817167282104492
699999 8.817167282104492
Result: y = 7.448800243281539e-09 + 0.8567265868186951 x + -1.1153709067457385e-08 x^2 + -0.09332836419343948 x^3
```

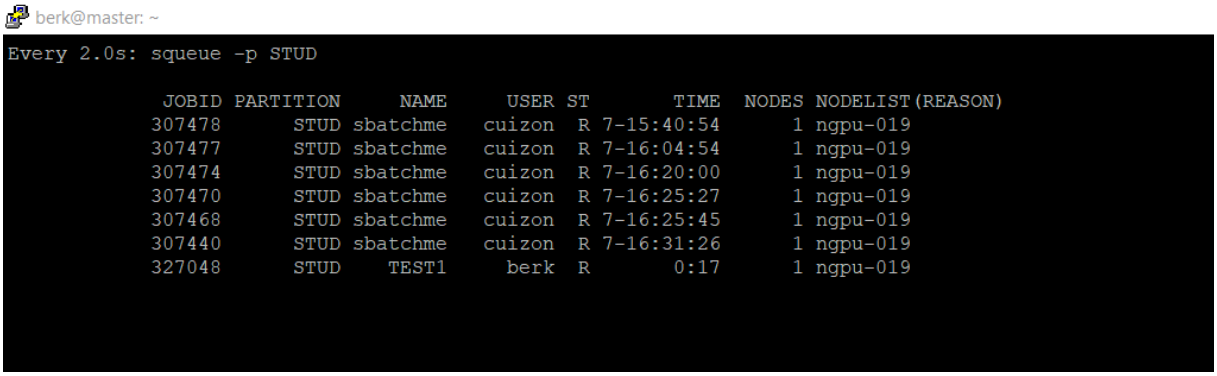
Checking the all queue

```
(berk_fruit) berk@master:~$ squeue
             JOBID PARTITION     NAME     USER ST       TIME  NODES NODELIST(REASON)
            308153       GPU    TEST1      siu PD       0:00      1 (Job's account not permitted to use this partition (GPU allows staff not stud))
            308155       GPU    TEST1      siu PD       0:00      1 (Job's account not permitted to use this partition (GPU allows staff not stud))
            319223      TEST GPU_tens  rscholz PD       0:00      1 (Resources)
            323252      CPU3 index-68  hsjomaa PD       0:00      1 (Resources)
            323253      CPU3 index-69  hsjomaa PD       0:00      1 (Priority)
            323254      CPU3 index-70  hsjomaa PD       0:00      1 (Priority)
            323255      CPU3 index-71  hsjomaa PD       0:00      1 (Priority)
            323256      CPU3 index-72  hsjomaa PD       0:00      1 (Priority)
            323257      CPU3 index-73  hsjomaa PD       0:00      1 (Priority)
            323258      CPU3 index-74  hsjomaa PD       0:00      1 (Priority)
            323259      CPU3 index-75  hsjomaa PD       0:00      1 (Priority)
            323260      CPU3 index-76  hsjomaa PD       0:00      1 (Priority)
            323261      CPU3 index-77  hsjomaa PD       0:00      1 (Priority)
            323262      CPU3 index-78  hsjomaa PD       0:00      1 (Priority)
            323263      CPU3 index-79  hsjomaa PD       0:00      1 (Priority)
            323264      CPU3 index-80  hsjomaa PD       0:00      1 (Priority)
            323265      CPU3 index-81  hsjomaa PD       0:00      1 (Priority)
            323266      CPU3 index-82  hsjomaa PD       0:00      1 (Priority)
            323267      CPU3 index-83  hsjomaa PD       0:00      1 (Priority)
            323268      CPU3 index-84  hsjomaa PD       0:00      1 (Priority)
            323269      CPU3 index-85  hsjomaa PD       0:00      1 (Priority)
```

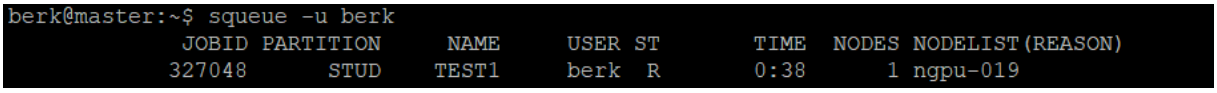
Checking the queue for Student partition

```
berk@master:~$ squeue -p STUD
             JOBID PARTITION     NAME     USER ST       TIME  NODES NODELIST(REASON)
            307478      STUD sbatchme   cuizon  R 7-15:40:43      1 ngpu-019
            307477      STUD sbatchme   cuizon  R 7-16:04:43      1 ngpu-019
            307474      STUD sbatchme   cuizon  R 7-16:19:49      1 ngpu-019
            307470      STUD sbatchme   cuizon  R 7-16:25:16      1 ngpu-019
            307468      STUD sbatchme   cuizon  R 7-16:25:34      1 ngpu-019
            307440      STUD sbatchme   cuizon  R 7-16:31:15      1 ngpu-019
            327048      STUD    TEST1     berk  R       0:06      1 ngpu-019
```

Watch command to display running jobs in Student partition and my jobs



Display my running jobs – only to see jobs submitted by me (watch also possible and similar as we see above)



Ssh into ngpu-019 node to see if the job Is running on GPU

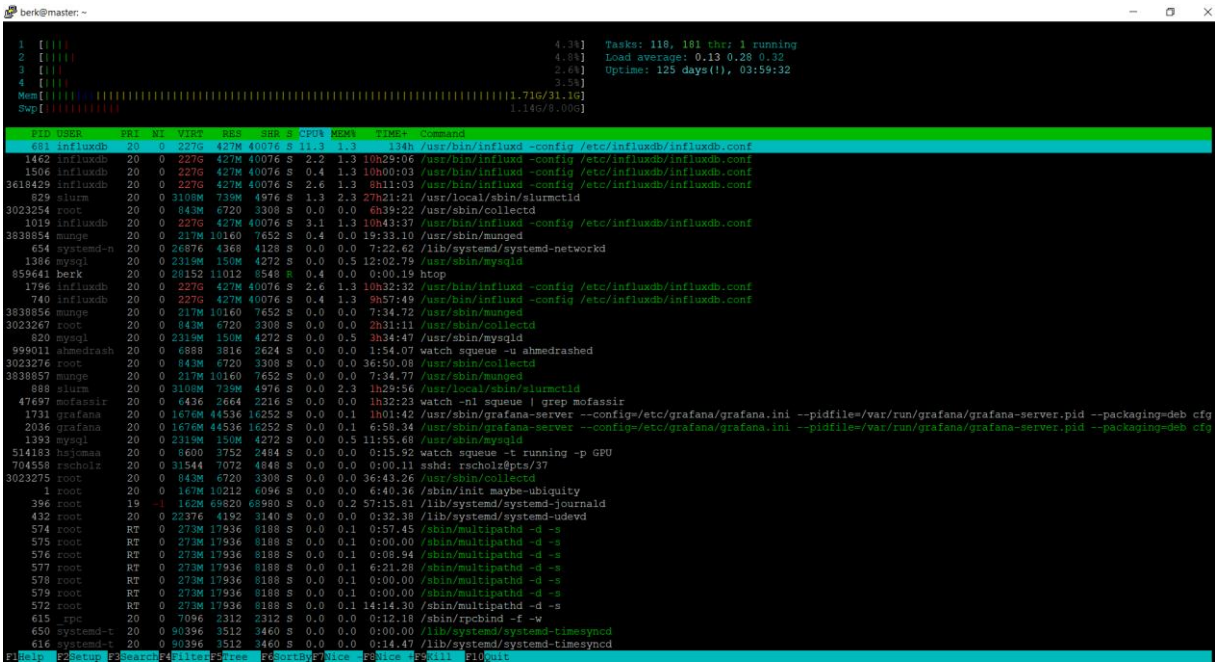
```
berk@ngpu-019:~$ nvidia-smi
Tue Feb  9 18:53:34 2021
+-----------------------------------------------------------------------------+
| NVIDIA-SMI 450.51.05    Driver Version: 450.51.05    CUDA Version: 11.0     |
|-------------------------------+----------------------+----------------------+
| GPU  Name        Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap|         Memory-Usage | GPU-Util  Compute M. |
|                               |                      |               MIG M. |
|===============================+======================+======================|
|   0  GeForce RTX 207...  On   | 00000000:1A:00.0 Off |                  N/A |
| 20%   29C    P8    16W / 215W |      1MiB /  7982MiB |      0%      Default |
|                               |                      |                  N/A |
+-------------------------------+----------------------+----------------------+
|   1  GeForce RTX 207...  On   | 00000000:1B:00.0 Off |                  N/A |
| 20%   32C    P8    16W / 215W |      1MiB /  7982MiB |      0%      Default |
|                               |                      |                  N/A |
+-------------------------------+----------------------+----------------------+
|   2  GeForce RTX 207...  On   | 00000000:1C:00.0 Off |                  N/A |
| 20%   32C    P8    17W / 215W |      1MiB /  7982MiB |      0%      Default |
|                               |                      |                  N/A |
+-------------------------------+----------------------+----------------------+
|   3  GeForce RTX 207...  On   | 00000000:1D:00.0 Off |                  N/A |
| 20%   34C    P8    10W / 215W |      1MiB /  7982MiB |      0%      Default |
|                               |                      |                  N/A |
+-------------------------------+----------------------+----------------------+
|   4  GeForce RTX 207...  On   | 00000000:1E:00.0 Off |                  N/A |
| 20%   33C    P8    10W / 215W |      1MiB /  7982MiB |      0%      Default |
|                               |                      |                  N/A |
+-------------------------------+----------------------+----------------------+
|   5  GeForce RTX 207...  On   | 00000000:3D:00.0 Off |                  N/A |
| 20%   29C    P8    10W / 215W |      1MiB /  7982MiB |      0%      Default |
|                               |                      |                  N/A |
```

```
+-------------------------------+----------------------+----------------------+
|   6  GeForce RTX 207...  On   | 00000000:3E:00.0 Off |                  N/A |
| 20%   34C    P8    22W / 215W |      1MiB /  7982MiB |      0%      Default |
|                               |                      |                  N/A |
+-------------------------------+----------------------+----------------------+
|   7  GeForce RTX 207...  On   | 00000000:3F:00.0 Off |                  N/A |
| 20%   31C    P8    18W / 215W |      1MiB /  7982MiB |      0%      Default |
|                               |                      |                  N/A |
+-------------------------------+----------------------+----------------------+
|   8  GeForce RTX 207...  On   | 00000000:40:00.0 Off |                  N/A |
| 20%   32C    P8    12W / 215W |      1MiB /  7982MiB |      0%      Default |
|                               |                      |                  N/A |
+-------------------------------+----------------------+----------------------+
|   9  GeForce RTX 207...  On   | 00000000:41:00.0 Off |                  N/A |
| 20%   35C    P8    20W / 215W |      1MiB /  7982MiB |      0%      Default |
|                               |                      |                  N/A |
+-------------------------------+----------------------+----------------------+

+-----------------------------------------------------------------------------+
| Processes:                                                                  |
|  GPU   GI   CI        PID   Type   Process name                  GPU Memory |
|        ID   ID                                                   Usage      |
|=============================================================================|
|  No running processes found                                                 |
+-----------------------------------------------------------------------------+
berk@ngpu-019:~$ Connection to ngpu-019 closed by remote host.
Connection to ngpu-019 closed.
```

Htop shows:

```
berk@master:~$ htop
```



Explanation: IT monitors the systems resource usage through users by frequently updating. We can see command by a user and how much time it is taking, CPU usage etc.

Copy a data from my local computer to the master with "scp" command

```
user@DESKTOP-U52L9RM MINGW64 ~/Documents
$ scp lab_doc.txt berk@master.ismll.de:/home/berk/lab_doc.txt
berk@master.ismll.de's password:
lab_doc.txt
```

berk@master: ~

```
berk@master:~$ ls
anaconda3  Anaconda3-5.3.1-Linux-x86_64.sh  bashme.sh  berk_example.py  lab_doc.txt  TEST_327048.log
berk@master:~$ nano lab_doc.txt
```

berk@master: ~

```
  GNU nano 4.8                                                    lab_doc.txt
This is document to check for lab exercise.
```