

Questions for the course “Using Python in an HPC environment”, 5-6 December 2024

Please note the following:

- Add your questions below, numbering them continuously.
- Be careful in case someone else is writing at the same time.
- Please **DO NOT** delete your questions even when they have been answered, as we are planning to use them to improve our material.
- Do not share any sensitive information as this document is accessible to anyone with the correct link.
- You can start a new line *within* a question by pressing <SHIFT> + <ENTER>.

1. General information / summary:

<https://umeauniversity.sharepoint.com/:w/s/HPC2N630/ETZGlePhQLhFjuJdw-mKfUBGiX1SVCsrFdBpEnbwNAumg?e=YC7DJD>

2. Hostnames for login nodes (the main course project is at NSC/UPPMAX):

- a. UPPMAX – rackham
 - i. **SSH:** rackham.uppmax.uu.se
 - ii. **ThinLinc:** rackham-gui.uppmax.uu.se
 - 1. 2FA may be needed, which can be handled by logging in with regular SSH, doing 2FA, logging out again, then there is a grace period of some minutes for you to login to ThinLinc. More here: <https://www.uu.se/en/centre/uppmax/get-started/2-factor>
 - iii. **From webbrowser:** <https://rackham-gui.uppmax.uu.se/>
- b. NSC – Tetralith
 - i. **SSH:** tetralith.nsc.liu.se
 - ii. **ThinLinc:** tetralith.nsc.liu.se
 - iii. 2FA is needed. Info here about setup: <https://www.nsc.liu.se/support/2fa/>
- c. HPC2N - Kebnekaise
 - i. **SSH:** kebnekaise.hpc2n.umu.se
 - ii. **ThinLinc:** kebnekaise-tl.hpc2n.umu.se
 - iii. **From webbrowser:** <https://kebnekaise-tl.hpc2n.umu.se:300/>
- d. LUNARC – Cosmos
 - i. **SSH:** cosmos.lunarc.lu.se
 - ii. **ThinLinc:** cosmos-dt.lunarc.lu.se
 - iii. 2FA is needed. Info here: https://lunarc-documentation.readthedocs.io/en/latest/getting_started/login_howto/ and here: https://lunarc-documentation.readthedocs.io/en/latest/getting_started/authenticator_howto/

3. Course project at **UPPMAX**: naiss2024-22-1442

4. Storage area for the course project at **UPPMAX**: /proj/hpc-python-fall
5. Course project at **NSC**: naiss2024-22-1493
6. Storage area for the course project at **NSC**: /proj/hpc-python-fall-nsc
7. Course project at **HPC2N**: hpc2n2024-142
8. Storage area for the course project at **HPC2N**: /proj/nobackup/hpc-python-fall-hpc2n
9. Course project at **LUNARC**: lu2024-2-88
10. Create a directory for you to work in, in your project storage directory, and then you may get the course material from GitHub using:
 - a. git clone <https://github.com/UPPMAX/HPC-python.git>
11. Get the exercises either from the tarball (wget <https://github.com/UPPMAX/HPC-python/raw/refs/heads/main/exercises.tar.gz>) or from:
`git clone https://github.com/UPPMAX/HPC-python.git`
12. How soon will the recordings be available?
 - a. As soon as possibly 😊 Hopefully within a couple of days
13. What is the weather at your place
 - a. Cold but cozy 😊
 - b. Cloudy and -1 C (up from -12 C yesterday).
 - i. Actually, now the sky has become almost blue with only few clouds.
Sunny.
 - c. Clouds and 4C
14. Is it ok to use your user directory as your WD?
 - a. if you mean your HOME directory, remember that it has a limited space, so it is recommended to use the project directory
 - b. I mean /proj/hpc-python-fall-nsc/users/x_[username]
 - c. On LUNARC, if you're asking, there is probably plenty of space in your home directory. LUNARC gives users much larger quotas than the other HPC centers.
15. With virtual environments can we use it several people in a group or should we all install it?
 - a. If you know that you will use the same and agree on what should be installed/one is in charge, then it can work to have a shared one. For instance, in the top of your shared project storage. Otherwise, you would usually each have your own.
16. Why are there virtual venvs in the top directory?
 - a. It is some we have created for the course, so those would be shared. Especially at Tetralith there is a need to create venvs for most of the ML/DL stuff
17. What kind of operating system is on your computer Brigitte? It has the icons on the side
 - a. Linux Ubuntu, with Ubuntu desktop which orders the icons that way. It's the default, and I should change it as I prefer XFCE or Gnome (classic). Or even KDE.
18. If one has access to both conda and venv, how should one choose which to use?
 - a. It depends a little on what you are doing and which center. If there is already a lot of modules with Python packages installed at the center then using a venv would take up much less space as you can reuse most already there. Conda can't use

- the modules installed at the center (at least it risks breaking if it tries to as the versions may be different).
- If you don't have full internet access (like on Bianca) then you would use conda. You can also use conda to distribute a working setup of packages, though that can also be done with a requirements file in Python venv
19. [sahar@cosmos3 HPC-python]\$ venv1/bin/activate
 -bash: venv1/bin/activate: Permission denied
 I created venv1 in Lunarc as: ([sahar@cosmos3 HPC-python]\$ python -m venv --system-site-packagip lorisges venv1), the activation of that env is denied ?
 a. Did you try "source my-env/bin/activate"?
 I missid source, thanks!
20. Hi! pip freeze --local returns an empty output.
- Where are you? What is loaded? Are you inside a venv?
 - I am on Tetralith, I have created my environment and have loaded the modules mentioned in the instructions. I have activated the environment. "pip list" gives me a long list of stuff but I think they're not local.
 - Pip list output then? Did you do pip install in the environment?
 - did you all do "python -m venv <name or env>"
 I saw that that step was missing in the summary of workflow
 - I had, but I followed your instructions from the chat and it worked. Could you please also update those on the course instructions?
 - DONE
21. Is it considered best practice to separate the actual script from the SLURM file like it is done here, or is it just for convenience in running it in multiple centres?
- Not sure what you mean, but sbatch script should be separate from the python script
 - I've seen that some Rscripts include batch info in the code, but I haven't seen it for python so far. Probably possible, but much easier for overview to separate them, I believe. It is about modularity
22. I ran the example for interactive use of the two scripts again on Kebnekaise.
 There are some intermittent access errors, possibly related to the router upgrade.
 Anyway, after rerunning a few times it worked long enough for me to log it:
 b-an01 [/proj/nobackup/hpc-python-fall-hpc2n/bbrydsoe/HPC-python/Exercises/examples/programs]\$ salloc -n 4 --time=00:10:00 -A hpc2n2024-142
- ```
salloc: Granted job allocation 32290257
salloc: Waiting for resource configuration
salloc: Nodes b-cn1703 are ready for job
b-an01 [/proj/nobackup/hpc-python-fall-hpc2n/bbrydsoe/HPC-python/Exercises/examples/programs]$ srun python sum-2args.py 2 3
The sum of the two numbers is: 5
The sum of the two numbers is: 5
The sum of the two numbers is: 5
```

```
The sum of the two numbers is: 5
b-an01 [/proj/nobackup/hpc-python-fall-hpc2n/bbrydsoe/HPC-
python/Exercises/examples/programs]$ srun python add2.py
4
5
Enter the first number: Enter the second number: The sum of 4 and 5 is
9
Enter the first number: Enter the second number: The sum of 4 and 5 is
9
Enter the first number: Enter the second number: The sum of 4 and 5 is
9
Enter the first number: Enter the second number: The sum of 4 and 5 is
9
b-an01 [/proj/nobackup/hpc-python-fall-hpc2n/bbrydsoe/HPC-
python/Exercises/examples/programs]$
```

```
b-an01 [/proj/nobackup/hpc-python-fall-hpc2n/bbrydsoe/HPC-python/Exercises/examples/programs]$ salloc -n 4 --time=00:10:00 -A hpc2n2024-142
salloc: Granted job allocation 32290257
salloc: Waiting for resource configuration
salloc: Nodes b-cn1703 are ready for job
b-an01 [/proj/nobackup/hpc-python-fall-hpc2n/bbrydsoe/HPC-python/Exercises/examples/programs]$ srun python sum-2args.py 2 3
The sum of the two numbers is: 5
b-an01 [/proj/nobackup/hpc-python-fall-hpc2n/bbrydsoe/HPC-python/Exercises/examples/programs]$ srun python add2.py
4
5
Enter the first number: Enter the second number: The sum of 4 and 5 is 9
Enter the first number: Enter the second number: The sum of 4 and 5 is 9
Enter the first number: Enter the second number: The sum of 4 and 5 is 9
Enter the first number: Enter the second number: The sum of 4 and 5 is 9
b-an01 [/proj/nobackup/hpc-python-fall-hpc2n/bbrydsoe/HPC-python/Exercises/examples/programs]$
```

- 23.
24. Can we just use a regular terminal with python instead of using spyder or the other tools? I find them really confusing and causing extra work/resource use, and it is much easier to just give the commands directly in a terminal. Nice for space on the screen also. Can this work for this course?
- Yes for many of the lessons
  - But for the afternoon analysis session and tomorrow's morning sessions jupyter will be the best choice
  - We'll show a couple of matplotlib examples on the terminal later as well, but Matplotlib and Seaborn are better to use in a GUI where you can experiment with the formatting. It's perfectly doable on the terminal, but it does make extra work for you if you need to repeatedly test and adjust your script. In Spyder, you just edit your script and click the green arrow.
25. Did we go directly to next session or will we also do the other IDEs first?
- We combined it
  - Jupyter should be covered soon
26. Is it possible to use venv with version of python that is not installed, for example if I want to test something with python 3.12
- No
  - Then you need conda (NSC, LUNARC, UPPMAX)
  - Or you install a "private" one. But that can interfere with the python modules if you try to use them. Caution is needed
  - You could ask for a newer python module

27. Can we get code for these changes from Spyder which we just made...for example setting up spaces between the plots etc

- a. The recommended changes to Spyder are given on the website.
- b. For adjusting spacing between plots, I will cover that a bit in the Matplotlib session.
- c. okay, my question was like in MATLAB it also produces the code for manullay performed actions, that we can write-back to our script to be used in future
- d. Spyder doesn't do that, sorry. The way it's done in code is this:  
[https://matplotlib.org/stable/api/\\_as\\_gen/matplotlib.pyplot.subplots\\_adjust.html](https://matplotlib.org/stable/api/_as_gen/matplotlib.pyplot.subplots_adjust.html)
- e. But in spyder you can look up commands in the help window in the top right pane

28. I apologize if you have already mentioned it. Where will I find the recordings?

- a. info will be sent in the end of today or tomorrow

29. So Jupyter (opening the link in a web browser) can't be accessed with login through ssh, you need a thinlinc?

- a. No, you need a gui to render it. SSH only provides the command line interface.
- b. if you logged in with ssh -X it may work but slower
- c. technically you can with X-forwarding, but in my experience, that's so slow that it's unusable
- d. At HPC2N, you need to be in HPC2N's domain, so in order to run Jupyter you must open the url for Jupyter server in a browser that is running on a machine in HPC2N's domain – so the only real option is inside ThinLinc since you otherwise would also need to run the browser through ssh -X (which would be slow).
- e. For some of the other centers you can do ssh tunneling, and then you don't need Thinlinc but can do as I just did and open two terminals and login on one and start jupyter and then connect with ssh tunnel from the other terminal. Then you can open in a local browser

30. INFO: you can also install with pip directly from spyder and jupyter!!

31. Is it possible to make use of multiple cores/nodes from jupyter? Let's say invoking srun from within it. Or can it exclusively be used for non-parallel code?

- a. You can allocated more cores for in when you start it, in the batch script or so, then you can run parallel code (NSC, HPC2N, UPPMAX – or LUNARC if you start it not from On-Demand App)
- b. Yes. On LUNARC in particular, when you start the On-Demand App, the GfxLauncher window will have a little gear icon that brings up a second menu where you can change the number of cores, memory per core, and whether you want a full node. Usage of multiple nodes is not supported for the GUI itself, but scripts submitted via the GUI may be able to access additional resources.

32. How do we access matplotlib on tetralith?

- a. You can do: ml buildtool-easybuild/4.8.0-hpce082752a2 GCC/11.3.0 OpenMPI/4.1.4 Python/3.10.4 SciPy-bundle/2022.05 matplotlib/3.5.2 Tkinter/3.10.4

- b. You also need to add this to your Python script:

```
import matplotlib
matplotlib.use('TkAgg')
```

RP: is it TkAgg or Qt5Agg? When I tried with TkAgg on Rackham, it raised a compatibility issue, but I haven't used Tetralith. And everywhere else, I thought it was 'Tkinter'.

BB: I have tested. On tetralith/kebnekaise/lunarc it is TkAgg. You need to load the Tkinter module on these centres in order to be able to use the TkAgg backend.

- c. Remember, if you are working from the command line (not in ThinLinc), then you need to login with (x\_abcde should be changed to your username)

```
ssh -X x_abcde@tetralith.nsc.liu.se
```

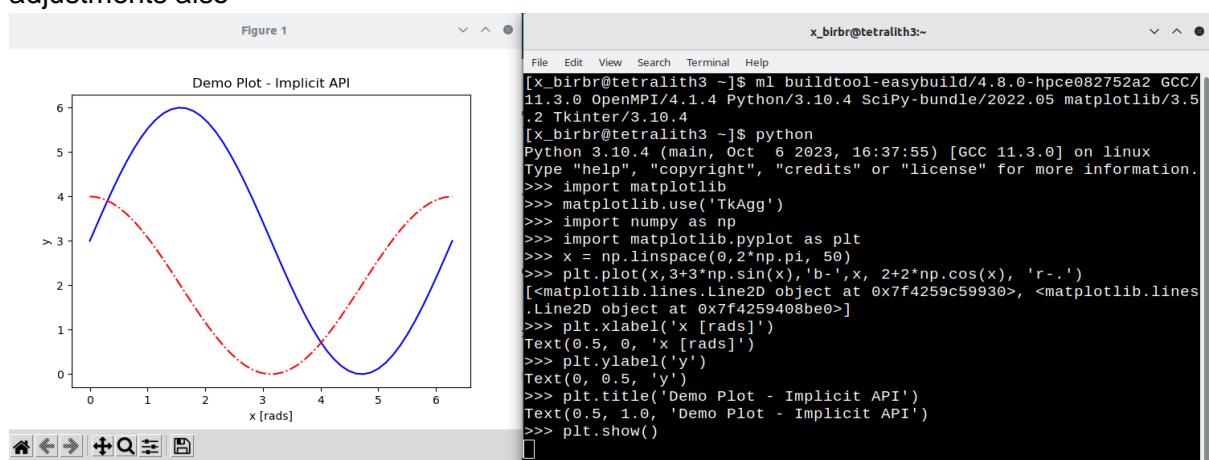
Or

```
ssh -Y x_abcde@tetralith.nsc.liu.se
```

33. If native backend on Rackham doesn't work, you can use

```
matplotlib.use('Qt5Agg')
```

34. On Tetralith, for the example (I have logged in with `ssh -Y x_birbr@tetralith.nsc.liu.se`) As you can see, it opens the plot as it should after you have loaded the modules and added the two lines mentioned in 32b. If you click on the button with sliders on (at the bottom of the plot window) you can do the small adjustments also



35. On LUNARC CSENS, is it possible to use these interactive Python IDEs, or is it only relevant when working on COSMOS?

36. NB: Some venvs are empty so far. They will be populated with packages by tomorrow afternoon!

37. <https://docs.uppmx.uu.se/software/tensorflow/>

tensorflow has its built-in gpu checker

probably other Tools as well

38. also:

```
def process():
 cuda_context = cuda.current_context()
 if cuda_context:
 return 'GPU'
 else:
 return 'CPU'
```

39. I updated the add-list.sh file for HPC2N and for NSC. Please do a git pull to get the new material

- a. (This is to be done from the git directory!)

40. Is there any particular difference between salloc and interactive that we should know about?

- a. Interactive is (at least at UPPMAX) a wrapper around salloc and provides graphics in a better way, for instance. I am not sure if salloc will give you x11 forwarding.

41. If anyone is still having issues accessing lu2024-17-44, please log out of your Thinlinc session and restart it with “end previous session” selected in the login window. That will force Thinlinc to start with a clean desktop and refreshed group memberships.

- a. Yes, Thinlinc is good (or bad) in that way, that it does not log you out when leaving the connection. It runs on its own until a grace time is over, or you manually log out.
- b. It is another way of doing the so-called screen session via ssh.

42. How long will access to the data folder /lunarc/nobackup/projects/lu2024-17-44 persist after the training?

- a. 1-2 weeks!

## Second day

43. On Rackham:

- a. pandas is in python/3.11.8
- b. seaborn needs python\_ML\_packages/3.11.8-cpu

44. On Kebnekaise:

- a. Pandas+seaborn:
- b. ml GCC/13.2.0 Python/3.11.5 SciPy-bundle/2023.11 Seaborn/0.13.2
- c. Or
- d. ml GCC/12.3.0 Python/3.11.3 SciPy-bundle/2023.07 Seaborn/0.13.2

45. On Cosmos:

- a. Pandas+seaborn:
- b. ml GCC/13.2.0 Python/3.11.5 SciPy-bundle/2023.11 Seaborn/0.13.2
- c. Or
- d. ml GCC/12.3.0 Python/3.11.3 SciPy-bundle/2023.07 Seaborn/0.13.2

46. On Tetralith:

- a. module load buildtool-easybuild/4.8.0-hpce082752a2 GCC/13.2.0  
Python/3.11.5 SciPy-bundle/2023.11 (JupyterLab/4.2.0)

47. If you need matplotlib on Kebnekaise (or on terminal/SSH -Y/SSH -X on Cosmos) and Tetralith you need to also add Tkinter and set the matplotlib backend. See #32 and #33 and the demo in load/run for day 1: [https://uppmax.github.io/HPC-python/day1/load\\_run\\_packages.html#demo-type-along](https://uppmax.github.io/HPC-python/day1/load_run_packages.html#demo-type-along)

48. Why is the datatype int64?

- a. Which part of the code did you refer to?
- b. 64 bit integer? 64 is how much memory allocated to store data for in a cell
- c. Its the memory footprint value which was in 64bit int type. (as you now know)

49. why the assumption on small number of unique values for groupby?

- a. For GroupBy, the number of groups doesn't have to be small if you have enough data. You just want each group to be large enough that your statistics are valid. For Categorical data (which seems like it might've been confused for GroupBy data) you very much do want a small number of unique values because the Categorical datatype only saves on memory if the number of categories is much smaller than the total number of data points. If more than half of the data are unique, the Categorical type can start to use more memory than the original format.

50. Can we follow similar procedure for parallelisation on COSMOS, too?

- a. Yes

51. What is an integral? And why do we need this for parallel computing?

52. How do we start Julia? The last command returns an error on Tetralith:

- For the Julia example we will need PyJulia:

```
$ ml julia/1.9.4-bdist
$ pip install JuliaCall
```

Start Julia on the command line and add the following package:

```
pkg> add PythonCall
```

- a. What error do you get?

53. Parallel computing with Python-section

54. For newer Python versions, for the numba parallel example you could use:

- a. Kebnekaise: ml GCC/12.3.0 Python/3.11.3 SciPy-bundle/2023.07 OpenMPI/4.1.5 numba/0.58.1
  - i. No virtual environment then needed
- b. Rackham: ml python/3.11.8 python\_ML\_packages/3.11.8-gpu
  - i. No virtual environment then needed

- c. Cosmos: ml GCC/12.2.0 OpenMPI/4.1.4 Python/3.10.8 SciPy-bundle/2023.02 numba/0.58.0
  - d. Tetralith: You need a virtual environment.
    - i. Do this to load needed modules: module load buildenv-gcccuda/12.2.2-gcc11-hpc1 Python/3.10.4-env-hpc2-gcc-2022a-eb
    - ii. During the course, use the virtual environment created by the instructors:
      1. source /proj/hpc-python-fall-nsc/venvNSC-numba/bin/activate
    - iii. Later, at NSC, create the virtual environment yourself:
      1. module load buildenv-gcccuda/12.2.2-gcc11-hpc1 Python/3.10.4-env-hpc2-gcc-2022a-eb
      2. python -m venv venvNSC-numba
      3. source venvNSC-numba/bin/activate
      4. pip install --ignore-installed numpy scipy numba
      5. deactivate
      6. Now you can just (in for instance your batch script) load the modules in 1) and then do 3) - remember to add the path to the virtual environment if you installed it in another directory than the one you are working in
55. For mpi4py example
- a. Kebnekaise: ml GCC/12.3.0 Python/3.11.3 SciPy-bundle/2023.07 OpenMPI/4.1.5 numba/0.58.1 mpi4py/3.1.4
  - b. Rackham: There is no mpi4py installed, so you need a virtual environment. You could do:
    - i. `module Load python/3.11.8 python_ML_packages/3.11.8-cpu openmpi/4.1.5`
    - ii. `python -m venv mympi4py`
    - iii. `source mympi4py/bin/activate`
    - iv. `pip install mpi4py`
    - v. `Then activate the environment (like in 55b.iii) in the batch script after loading the modules in 55b.i`
  - c. Cosmos: ml GCC/12.2.0 OpenMPI/4.1.4 Python/3.10.8 SciPy-bundle/2023.02 numba/0.58.0 mpi4py/3.1.4
  - d. Tetralith: To run something with just mpi4py (and not numba), you can use these modules:
    - i. module load buildtool-easybuild/4.8.0-hpce082752a2 GCC/13.2.0 OpenMPI/4.1.6 mpi4py/3.1.5
    - ii. If you also need numba, you have to use the example in 54d.3 and install mpi4py to the virtual environment as well
56. For f2py example
- a. Kebnekaise: when the stuff in #54 is loaded, you can access the command `f2py` on the command line (actually ml GCC/12.3.0 Python/3.11.3 SciPy-bundle/2023.07 is enough)
  - b. Rackham: ml python/3.11.8
  - c. Cosmos: ml GCC/12.2.0 Python/3.10.8 SciPy-bundle/2023.02
    - i. Or
    - ii. ml GCC/13.2.0 Python/3.11.5 SciPy-bundle/2023.11

- d. Tetralith: ml buildtool-easybuild/4.8.0-hpce082752a2 GCC/13.2.0 SciPy-bundle/2023.11
57. I tried installing mpi4py on cosmos, but it failed midway. Is there a solution or is it already included in a module I need to load?
- a. This should work: ml GCC/12.2.0 OpenMPI/4.1.4 Python/3.10.8 SciPy-bundle/2023.02 numba/0.58.0 mpi4py/3.1.4
58. Which software package provides f2py on the HPC platforms?
- a. On Kebnekaise and Cosmos it would be enough to load something like ml GCC/12.3.0 Python/3.11.3 SciPy-bundle/2023.07
  - b. On Rackham just load python/3.11.8
  - c. On Tetralith load buildtool-easybuild/4.8.0-hpce082752a2 GCC/13.2.0 SciPy-bundle/2023.11
59. What is the maximum memory per node on COSMOS?
- Ok – question just answered in presentation
- a. 256 GB (5.3 GB/core)\* (\*Note, this is the memory per core when the memory per node is shared equally between all cores. You can force individual cores to borrow against the memory of other cores, but that is generally not an efficient use of resources because it can leave other cores without enough memory to function. If you're a paying user, you'll be charged for any cores rendered unusable as well as the cores that were actually used.)
  - b. <https://www.lunarc.lu.se/systems/cosmos/>
60. If we have a large dataset and the code requires fitting a model over hundreds of iterations over that data (therefore we need a lot of memory), what is the best practice? How do we get the most memory using only CPU?
- a. Try book one of the larger nodes at you center
  - b. Depends on the shape of your data, the shape of your model, the order of operations, and whether most of the volume of data is taken up by computing the different realizations of the data or fitting those realizations (I would typically assume the latter is much bigger, but resampling ND data can also get pretty expensive).
  - c. If most of the volume is taken by the data instead of model, try performing data parallelism. You might benefit from running batches of data with multiple model instances and then combining the results. Depends on the type of model too.
    - i. The data is up to about 20 GB, but the model can take up to > 1.7TB depending on the size of the parameters and the percentage of data used.
  - d. Try to also manage your data well by compressing and using formats like HDF5. Then decompressing only the chunks that are needed for the model to calculate.
    - i. Is that helpful if I need all of the data to fit the model?
61. NOTE: Good thing with netcdf (and HDF5) is that you do not load everything from the file (disk) to the memory directly. Just the pieces you want and can hold in memory.
62. About LLMs and these kind of models, they say it's trivially parallelizable to several GPUs, do you know how that is done? is there an easy way to say, "use all available GPUs"?

- a. Luckily LLMs have parallelizable model architecture. Encoder and decoders can be stacked up N times and/or put in different GPUs.
  - b. Using all GPUs is not straightforward if we don't know what we are optimizing for. Is the data parallelization? Model? Or both? They have different strategies.
  - c. The most common one to see is data parallelization where data is bigger than the model itself. In that case you can set CUDA\_VISIBLE\_DEVICES=0/1/2 etc when you call your model python file. Then your model will only run on that specific gpu. In this way you can load that GPU with a subset/batch of data and train it. Meanwhile a diff. Batch runs on a diff. GPU.
63. I am running the examples pytorch and tensorflow from the presentation on COSMOS, by just copying the code into a file and calling it with python (after having loaded the modules). Pytorch works but with tensorflow I get an error starting with:
- ```
=====
Gradient of x: tf.Tensor(
[[1. 1.]
 [1. 1.]], shape=(2, 2), dtype=float32)
Layer output: tf.Tensor([[1.9567696 0.32482982]], shape=(1, 2), dtype=float32)
Traceback (most recent call last):
File "/home/mivo/course/lu2024-17-44/HPC-python/day2_tensorflow.py", line 26, in <module>
    optimizer.apply_gradients(zip(gradients, layer.trainable_variables))
File "/sw/easybuild_milan/software/TensorFlow/2.11.0-foss-2022a-CUDA-11.7.0/lib/python3.10/site-packages/keras/optimizers/optimizer_experimental/optimizer.py", line 1139, in apply_gradients
    grads_and_vars = self.aggregate_gradients(grads_and_vars)
1. Yea, that code was just an example
```
- 64.
65. PLACEHOLDER
66. PLACEHOLDER
67. PLACEHOLDER
68. PLACEHOLDER
69. PLACEHOLDER
70. PLACEHOLDER
71. PLACEHOLDER
72. PLACEHOLDER
73. PLACEHOLDER
74. PLACEHOLDER
75. PLACEHOLDER
76. PLACEHOLDER
77. PLACEHOLDER
78. PLACEHOLDER
79. HPC2N YouTube channel will have the recordings later today or tomorrow:
<https://www.youtube.com/user/HPC2N/videos>
80. Zoom for parallel session (if any):
81. Direct link to the recordings playlist on HPC2N's YouTube:
82. Evaluation survey: <https://forms.office.com/e/ACQeam3sjt>

