Introduction to Advaned MPI features
PEARC 2020

1 Access to a cluster

You need to connect to a designated machine for doing exercises.

- Log in to the designated machine: (Stampede2/Frontera)
  ```
  ssh -X -l yourname stampede2.tacc.utexas.edu
  # or
  ssh -X -l yourname frontera.tacc.utexas.edu
  ```
  (If your name is the same at TACC as on your local machine, you can leave out the `-l yourname` option.)
- When prompted, use reservation `PEARC20_MPI`.
- If you already have an account on this machine, you may be prompted for which project to use. Your own or the class project `Frontera-Training` will both work.

2 Course materials

Course materials consist of pdf files and and exercise files. You probably want to open the pdf files on your local machine, so get them from:

`https://tinyurl.com/tacc-2020-pearc`

For doing the exercises you can find the same material on the cluster:

- Unpack the course materials in your directory:
  ```
  tar fxz ~train00/mpithree_course_2020.tgz
  ```
- Go into the course directory:
  ```
  cd mpithree_course
  ```
- You will find pdf files of the course and of a full textbook. It's a good idea to keep these open for reference.
- You will also find exercise directories for the languages C, C++, Fortran, Fortran2008, and Python. Pick your favourite.
- Fortran: it is advisable to use the `f08` directory.
- For C++ there is also the MPL package. To use this:
  ```
  export TACC_MPL_INC=/work/00434/eijkhout/mpl/mpl
  ```

3 Doing exercises

Review your slides about good citizenship at TACC: do not run parallel programs on the login nodes. Instead, follow these instructions:

- Start an interactive session, ideally on 2 nodes, for the duration of this course:
  `idev -N 2 -n 20 -t 6:0:0`
  That is: two nodes with 20 processes total, for 6 hours.
  (Given 2 nodes, you can request up to 96 processes on Stampede2 and 116 on Frontera, but that will make a mess of your screen output. Keep it small while you're learning.)
- The exercises will be named in the course. For instance, there will be a 'hello' exercise. The setup for this exercise will be in the file `hello.c/cxx/F90/py`.
  To compile the exercise, do
  `make hello`
  This will give you a program that you can run in parallel with `ibrun`:
  `ibrun hello`