

Crib Sheet: Cirrus MPI Exercises

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1 Logging on

Use your username (`trainXX`) and password to access Cirrus: `ssh -XY trainXX@cirrus.epcc.ed.ac.uk`

2 Obtaining source code

You can obtain `MPP-templates.tar` by using `wget` on Cirrus:

```
wget http://www.archer.ac.uk/training/course-material/2018/11/mpi-newcastle/
exercises/MPP-templates.tar
```

To obtain this URL, cut and paste it from the Exercise Material section of the course web pages. Now unpack the tar file: `tar -xvf MPP-templates.tar` and change directory into it: `cd MPP-templates`

3 Compiling code

You **must** load non-default modules to access the correct version of MPI:

```
module load mpt
module load intel-compilers-17
```

You can compile the C, C++ and Fortran codes directly:

```
mpicc -cc=icc -o hello hello.c
mpicxx -cxx=icpc -o hello hello.cc
mpif90 -o hello hello.f90
```

or using the supplied Makefiles

```
make -f Makefile_c
make -f Makefile_cc
make -f Makefile_f90
```

This uses the Intel compilers. If you want to use the GNU compilers then you should unload the `intel-compilers-17` module and omit the `-cc=` flag.

4 Running

You can run parallel jobs interactively from the command line, e.g.:

```
mpirun -n 4 ./hello
```

Running on the front-end like this you are sharing resources with other users. This is fine for development work, but if you want accurate timings for benchmarking you must run on the compute nodes using the PBS batch system.

Make a copy of the PBS template file **to match your executable name**, e.g. `cp cirrusmpi.pbs hello.pbs`

Now submit to the course queue in the batch system: `qsub hello.pbs`

Note that during the course there may be a dedicated queue - e.g. R123456 - which you can submit to using: `qsub -q R123456 hello.pbs`

The batch system will respond with a unique ID for your job: `XXXXXXXX.sdb`.

You can monitor the progress of your job with `qstat -u s1234567`. The letter "Q" indicates the job is queued, "R" that it is running, and no listing that it has finished.

When the job has finished, the output will appear in a file called `hello.pbs.XXXXXXX`

To change the number of processes you run on, edit the batch file and change the value of `NPROC`. To run on more than 36 processes (i.e. more than one Cirrus node) you will also need to change the line `select=1:ncpus=36`. For example, for 4 nodes (a maximum of 144 MPI processes) use `select=4:ncpus=36`.