**Exercise: MPI Hello World**

In this exercise, we’ll **MOSTLY** use the same conventions and commands as in the previous exercise(s). You should refer back to the previous exercise description(s) for details on various Unix commands.

You’ll be running your first MPI code, specifically an MPI version of the classic Hello World program.

Here are the steps for this exercise:

1. Log in to the Linux cluster supercomputer (boomer.oscer.ou.edu).
2. Conﬁrm that you’re in your home directory:

**pwd**

/home/yourusername

1. Check that you have a PPCC2012 subdirectory inside your home directory:

**ls**

PPCC2012

1. If you haven’t done so already, copy the HelloWorld directory into your PPCC2012 directory:

**cp -r ~hneeman/PPCC2012/HelloWorld/ ~/PPCC2012/**

1. Go into your PPCC2012 subdirectory:

**cd PPCC2012**

1. Conﬁrm that you’re in your PPCC2012 subdirectory:

**pwd**

/home/yourusername/PPCC2012

1. See what files or subdirectories (if any) are in the current working directory:

**ls**

1. Go into your HelloWorld subdirectory:

**cd HelloWorld**

1. Conﬁrm that you’re in your HelloWorld subdirectory:

**pwd**

/home/yourusername/PPCC2012/HelloWorld

1. See what files or subdirectories (if any) are in the current working directory:

**ls**

1. Choose which language you want to use (C or Fortran90), and cd into the appropriate directory:

**cd C/**

OR:

**cd Fortran90/**

1. Conﬁrm that you’re in your C or Fortran90 subdirectory:

**pwd**

/home/yourusername/PPCC2012/HelloWorld/C

OR the output of the pwd command might be:

/home/yourusername/PPCC2012/HelloWorld/Fortran90

1. See what files or subdirectories (if any) are in the current working directory:

**ls**

MPI OpenMP Serial

1. Go into your MPI subdirectory:

**cd MPI**

1. Confirm that you’re in your MPI subdirectory:

**pwd**

/home/yourusername/PPCC2012/HelloWorld/C/MPI

OR the output of the pwd command might be:

/home/yourusername/PPCC2012/HelloWorld/Fortran90/MPI

1. See what files or subdirectories (if any) are in the current working directory:

**ls**

1. Edit the batch script hello\_world\_mpi.bsub to use your username and e-mail address.
2. If you haven’t already examined hello\_world\_mpi.c (or hello\_world\_mpi.f90), do so now.
3. **IMPORTANT IMPORTANT IMPORTANT IMPORTANT IMPORTANT IMPORTANT**

Compile using the *shell script* make\_cmd:

**make\_cmd**

**NOTE**: A *shell script* is a file containing a sequence of Unix commands, which are executed like a program.

If that command fails, try this:

**./make\_cmd**

That is, put a dot (period) and a slash before make\_cmd, with no blank spaces.

1. Submit the batch script file hello\_world\_mpi.bsub to the batch scheduler:

**bsub < hello\_world\_mpi.bsub**

**NOTICE** the less than symbol < which is **EXTREMELY IMPORTANT**.

You should get back output something like this:

Job <######> is submitted to queue <ppcc\_q>.

where ###### is replaced by the batch job ID for the batch job that you’ve just submitted.

1. Check the status of your batch job:

**bjobs**

You’ll get one of the following outputs, either:

No unfinished job found

(if you get this right after the bjobs command, try it several more times, because sometimes there’s a pause just before the batch job starts showing up, as below),

OR something like this:

JOBID USER STAT QUEUE FROM\_HOST EXEC\_HOST JOB\_NAME SUBMIT\_TIME

4081250 yourusername PEND ppcc\_q boomer1 hello\_world\_mpi Oct 17 14:58

where ###### is replaced by a batch job ID number, and yourusername is replaced by your user name, and where PEND is short for “pending,” meaning that your job is waiting to start,

OR something like this:

JOBID USER STAT QUEUE FROM\_HOST EXEC\_HOST JOB\_NAME SUBMIT\_TIME

4081250 yourusername RUN ppcc\_q boomer1 c127 hello\_world\_mpi Oct 17 14:58

1. You may need to check the status of your batch job repeatedly, using the bjobs command, until it runs to completion. **This may take several minutes (occasionally much longer).**

You’ll know that the batch job has finished when it no longer appears in the list of your batch jobs:

No unfinished job found

1. Once your batch job has finished running, ﬁnd the *standard output* and *standard error* files from your job:

**ls -ltr**

Using this command, you should see files named

hello\_world\_mpi\_######\_stdout.txt

and

hello\_world\_mpi\_######\_stderr.txt

(where ###### is replaced by the batch job ID).

These files should contain the output of hello\_world\_mpi. Ideally, the stderr file should have length zero.

1. Look at the contents of the standard output file:

% **cat hello\_world\_mpi\_######\_stdout.txt**

(where ###### is replaced by the batch job ID).

You may want to look at the stderr file as well:

% **cat hello\_world\_mpi\_######\_stderr.txt**

1. If this run had **ANY** problems, then send e-mail to:

[support@oscer.ou.edu](mailto:support@oscer.ou.edu)

which reaches all OSCER operations staff plus Henry, and attach the following files:

make\_cmd

makefile

hello\_world\_mpi.c

hello\_world\_mpi.bsub

hello\_world\_mpi\_######\_stdout.txt

hello\_world\_mpi\_######\_stderr.txt