Compiling and Job Submission

Turning your source code into an executable code, then running it in batch mode.
C compiler

- -g option for debugging
- -X option to hardcode # of Pes
- -l to link with a library
- -O[0-3] for optimization
Fortran compiler

- -g option for debugging
- -X option to hardcode # of Pes
- -l to link with a library
- -O[0-3] for optimization
MPI library

- Link with –lmpi
- This is automatically done for your on jaromir, but you must remember to link if you are using mpi on most other systems
Running your program

- To run your program in parallel you need to issue the mpprun command
- Indicate the number of processors with –nX
- Example mpprun –n4 a.out
Interactive

• Interactive Mode
  – Used for compiling and debugging
  – Should not be used for production runs
  – Do not run multiple interactive jobs at the same time
  – Limit of 10 CPU minutes in interactive mode
Batch

• Batch Mode
  – Create a script
  – Submit to the queueing system
  – Available 24 hours
  – Should be used for production runs
Sample batch file

#QSUB –l mpp_t=3600
#QSUB –l mpp_p=2
#QSUB –o t3e.output –eo
set echo
ja
cd $TMP
cp ~/prog prog
cp ~/data data
mpprun –n2 prog > results
far store results results
ja -csth1Me

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Submit the job

- While logged into jaromir, use the qsub command

qsub jobfile
Monitor the job

- The qstat command displays the status of the job

qstat –a

Will show information about your job
Qstat output

88059.jaromir.psc.edu test.job username qm_12h_128@jaromir 34455 24 690 7113 R05

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Delete a job

- The qdel command will delete a job, use –k if the job is running
  - qdel jobid
  - qdel –k jobid
Output and Error files

• Upon completion of your batch job, you should receive an output and an error file (unless you combined them with the –eo option)
Typical Errors

- The current csh(23395) has received signal 26 (cpu limit exceeded)
  - Ask for more time in your batch job
- Warning: no access to tty; thus no job control in this shell
  - Simply indicating that it is a batch request, ignore this message
Exercises

• Login to jaromir and cd to your staging directory (you may need to create this)
  – mkdir /tmp/username
  – cd /tmp/username
Exercises Cont.

- Copy exer.f from /tmp/training to your staging directory
  - cp /tmp/training/exer.f.
- Compile
  - f90 exer.f –o exer
- Run interactively, enter in 3 integers
  - mpprun –n4 exer
Fortran Sample Code

• exer.f
  – Compile, link with the mpi library.
  – Run on 2 – 8 processors.
  – Enter 3 integers, the first being the size of the problem, the second being the number of iterations and the third being the number of processors used.
  – Outputs the time and flops.
Exercises Cont.

• Copy shuf.c from /tmp/training to your staging directory
  – cp /tmp/training/shuf.c .

• Compile
  – cc shuf.c –o shuf

• Run interactively on 4 processors
  – mpprun –n4 shuf

April 23, 2002
C Sample Code

- shuf.c
  - Compile, link with the mpi library.
  - Run on 2-8 processors.
  - Passes numbers via mpi.
Exercises – Job Submission

• Create a job that will
  – Request 50 seconds of execution time and 2 Pes
  – Change directory to $TMP
  – Copy the shuf executable from your /tmp/username directory to $TMP
  – Run shuf
  – Redirect the output to a file called output.shuf
  – Copy output.shuf to /tmp/username
Exercises – Job Submission 2

- Submit the job
- Check the status
- Check the error and output files
- Store output.shuf to far