Mills Community Cluster

http://www.it.udel.edu/research-computing
Goals

- Compile a program that uses openMP directives.
- Use a Grid Engine script to run a job in the threads parallel environment.
- Use a Grid Engine script to vary the OMP_NUM_THREADS for an array job.
Review

Bash

- `.bashrc` - aliases and functions
- `.bash_profile` - environment and startup

Filesystem

- `/home` - 2G quota, backed up
- `/scratch` - duration of job only
- `/lustre` - large, shared, not backed up
Getting started

- Connect to mills
  
  ssh -l username mills.hpc.udel.edu

- Change to today's personal directory
  
  cd $WORKDIR/$USER
Possible Errors

- No such file or directory
  
  ```bash
  mkdir $WORKDIR/$USER
  ```

- Cannot create directory
  
  ```bash
  workgroup -g <investing_entity>
  mkdir $WORKDIR/$USER
  ```
Copy Examples

cp -r ~trainf/ex-day3 .
cd ex-day3
Parallel Environments

- Show a list of defined parallel environments currently available
  
  `qconf -spl`

- Show your workgroup queues configured for parallel environments
  
  `qconf -sq $WORKGROUP* | egrep "(qname|pe_list)"`
OpenMP directives

- **Fortran**

  ```fortran
  !$OMP PARALLEL DEFAULT(SHARED) PRIVATE(BETA, PI)
  ```

- **C**

  ```c
  #pragma omp for schedule (static, chunk)
  ```
Grid Engine

- Threads parallel environment
  
  `-pe threads 12-24`
Example (umanitoba)

cd ..:/umanitoba
  . sourceme-pgi
qsub mmult.qs
Grid Engine

- Array job varying
  OMP_NUM_THREADS

  export OMP_NUM_THREADS=$SGE_TASK_ID

  qsub -t 1-12 mmult.qs
Continue (umanitoba)

. copyme2scratch
qsub -t 1-12 mmult.qs
OpenMP Exercises

- Fortran and C files from Lawrence Livermore National Laboratory (LLNL)

https://computing.llnl.gov/tutorials/openMP/exercise.html
Help?

- Consulting questions should be sent to the IT Support Center <consult@udel.edu>.
- If you make the first line of the e-mail message

  Type=Cluster-Mills

your question will be routed more quickly.