

# Introduction to MPI and RHIT cluster resources

S. Allen Broughton

# Agenda

- Cluster webpage
- Improvements we could work on
- MPI
- On your own

# Cluster webpage

- <http://www.rose-hulman.edu/class/parallel/HTML/>
- [Seminar](#)
- [Documents and Links](#)
- [Updates](#)

# Improvements we could work on

- Matlab on the cluster
- Getting MPI set up for the GNU compilers
- IMSL (costs money)
- X-windows interface from laptops

# MPI

- Setting up a session for working on the cluster
- Commands for compiling and running programs on the cluster
- MPI structure
- MPI commands
- Example programs

# Setting up a session for working on the cluster

- Configure SecureCRT for an ssh session with brain
- Configure SecureFX for an sftp session with brain
- Pull up the manuals in a browser

# Commands for compiling and running programs

- For the PGI compilers
- Compile
  - `pgf77 -o progname progname.f -Impich -Mextend`
  - `pgf90 -o progname progname.f -Impich -Mextend`
  - `pgcc -o progname progname.c -Impich`
  - `pgCC -o progname progname.c -Impich`
- Run
  - `mpirun -np n progname`
  - `mpirun -nolocal -np n progname`

# MPI structure

- Same program runs on every node
- Initialize MPI
  - Find the number of processors
  - Find the rank or id of the process (node)
- Run the possibly rank dependent code using message passing as appropriate
- Clean up

# MPI commands

- initialization
  - MPI\_INIT
  - MPI\_COMM\_SIZE
  - MPI\_COMM\_RANK
- Message passing
  - MPI\_SEND
  - MPI\_RECV
  - Many other variants
- Clean up
  - MPI\_FINALIZE

# Sample Programs

- <http://www.rose-hulman.edu/class/parallel/HTML/materials/workshop/>
- mpihello
  - tests to see if MPI is working
- mpizetasum
  - An embarrassingly parallel program for distributing jobs and putting together the results (sum a series)
- mpisteep
  - A program in which many sends and receives are coordinated by the master node