Using MPI in tembusu for CS3211 Parallel and Concurrent Programming

You need to login to tembusu.comp.nus.edu.sg If you have difficulty, go to https://mysoc.nus.edu.sg/~myacct/ click on Services, and enable tembusu access.

To compile MPI program

cpi.c is an example program provided by the MPICH distribution. It and other examples can be found in /opt/mpich/examples. Myrinet examples are from tembusu1 which has a 64-node Myrinet network. In the following sample instruction, the same program is used to illustrate both MPICH and LAM-MPI. First, copy the program into your home directory. Then, follow the steps below.

1. MPI program running over Ethernet (MPICH)
   [user@access0]$ /opt/mpich/bin/mpicc -c cpi.c]
   [user@access0]$ /opt/mpich/bin/mpicc -o cpi cpi.o]
2. MPI program running over Ethernet (LAM-MPI)
   [user@access0]$ /opt/lam-mpi/bin/mpicc -g -c cpi.c]
   [user@access0]$ /opt/lam-mpi/bin/mpicc -g cpi.o -o cpi]
3. MPI program running over Myrinet (applicable to Myrinet nodes ONLY)
   [user@compute-0-36]$ /opt/mpich/myrinet/gcc/bin/mpicc -c cpi.c]
   [user@compute-0-36]$ /opt/mpich/myrinet/gcc/bin/mpicc -o cpi-gm cpi.o]

Prerequisite: Creating the machine file

1. For MPICH, create a machine file that looks like this:

```
# cat mynodes
access0
access1
access2
access3
access4
access5
access6
access7
access8
access9
```

2. The machine file for LAM-MPI should look something like this:

```
# cat machinefile
access0.cl.comp.nus.edu.sg cpu=2
access1.cl.comp.nus.edu.sg cpu=2
access2.cl.comp.nus.edu.sg cpu=2
access3.cl.comp.nus.edu.sg cpu=2
access4.cl.comp.nus.edu.sg cpu=2
access5.cl.comp.nus.edu.sg cpu=2
```

access6.cl.comp.nus.edu.sg cpu=2
access7.cl.comp.nus.edu.sg cpu=2
access8.cl.comp.nus.edu.sg cpu=2
access9.cl.comp.nus.edu.sg cpu=2

Run lamboot to launch the LAM runtime environment.
[user@access0]$ lamboot -v -ssi boot rsh machinefile

lamboot will invoke the LAM-MPI requisite programs via SSH on all compute nodes listed in the machine file.

To run MPI program over Ethernet

1. Run binary MPI program (MPICH)
   [user@access0]$ /opt/mpich/bin/mpirun -machinefile mynodes -np 8 /home/user/cpi
2. Run binary MPI program (LAM-MPI)
   [user@access0]$ /opt/lam-mpi/bin/mpirun C /home/user/cpi

More information on MPI

More documentation on the MPICH distribution can be found on its website.
LAM MPI documentation can be found here.
LAM MPI tutorials are found here.

Using MPI with SGE

SGE is tightly coupled with MPICH and allows you to submit MPICH jobs. To do so, you are going to need a script file that calls mpirun.

The script file should look like:

```
#
# My MPICH SGE Submission script
#
# SGE gives me 2 parameters
# $NSLOTS = the number of slots
# $TMPDIR/machines = the machine file
#
# I start the job with:
#
/opt/mpich/bin/mpirun -np $NSLOTS -machinefile $TMPDIR/machines /path/to/my/job
#
# Note that tembusu houses several different architecture so you
# need to use the mpirun from the correct directory:
# /opt/mpich - 32bit mpich (x86 Linux)
# /opt/mpich-64 - 64bit mpich (AMD64 Linux)
# /opt/mpich2-64 - 64bit mpich (AMD64 Linux) but MPICH2
```

You can start the job with

```
$ qsub -pe mpich <#slots> /path/to/my/script
```

Notes:

- If you use your own machine file, your job will start but will be killed by a cleanup process after a short while. This is described in Usage Policy for Compute Nodes.
- If your job does not start, take a look at the error file for a hint of what happened.