

CSS 434

Lab Work 2a: MPI Java Setup

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Lab work date: See the syllabus

1. Purpose

This laboratory work intends to set up your MPI Java execution environment. Follow the professor's explanation about how to use MPI Java and demonstrates an execution of `~css434/hw2/MatrixMult.java`.

2. Statement of Work

1. Set up your execution environment:

The process for setting it up to run the first time for each user is cumbersome. After the initial user set-up it works well without much fuss.

```
# login as self
```

```
# Need to be able to ssh without a password to other machines in
# order to use MPICH.
# run setup_mpi_cluster.sh. this creates ssh-keygen under ~/.ssh
./setup_mpi_cluster.sh
```

```
# The first time a new host is added to the first "ring"; it needs to be
# established by a "yes" response to "continue connecting". Every time the
# output hangs, type "yes".
```

```
# Note that setup_mpi_cluster.sh must have created this ring but just
# in case login each remote machine to check if you no longer need to type
# anything to get there.
```

```
ssh cssmpi1h
ssh cssmpi2h
ssh cssmpi3h
ssh cssmpi4h
ssh cssmpi5h
ssh cssmpi6h
ssh cssmpi7h
ssh cssmpi8h
```

```
# make file .mpd.conf
vi/emacs/pico .mpd.conf
```

```
# in it write one line:
secretword=
```

```
# where is a secure key you create but not your normal password
# save the file
```

```
# set the correct permissions on this file (other permissions won't work)
chmod 600 .mpd.conf
```

```
# create the mpd.hosts file in your home directory. The file should
include a list of cssmpi machines as seen in /home/NETID/css434/lab2/mpd.hosts:
cssmpi2h
```

```
cssmpi3h
cssmpi4h
```

Note that you should not include cssmpi1h where you are logging in.

edit .bash_profile file as follows:

```
export PATH=/usr/apps/mpich121-`uname -p`/bin:$PATH
export JAVAPATH=/usr/java/latest
export CLASSPATH=$CLASSPATH:/usr/apps/mpiJava-`uname -p`/lib/classes:.
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:/usr/apps/mpiJava-`uname -p`/lib
export PATH=/usr/apps/mpiJava-`uname -p`/src/scripts:$JAVAPATH/bin:$PATH
```

either relogin or type at the command line:
source .bash_profile

test that your set-up works on the current host
mpd &
mpiexec -n 1 /bin/hostname
mpdallexit

if you get an error or warning this is a problem.
You should get the hostname of your current host

CSSmpdboot -n 4 -v
mpdallexit

Note that, if you want to use all 8 machines, you have to list 7
machine names in your ~/mpd.hosts file. Then, type

CSSmpdboot -n 8 -v
mpdallexit

Now, you are ready to run a mpiJava program.
To compile:
javac *.java

to run
CSSmpdboot -n #cpus -v
mpirun -n #cpus java Hello
mpirun -n #cpus java MatrixMult size
mpirun -n #cpus java MyProgram

for your convenience, java_mpirun.sh is provided, but HW2 should be
executed directly with mpirun, (because of too many arguments.)
./java_mpirun #cpus Hello
./java_mpirun #cpus MatrixMult size
./java_mpirun #cpus MyProgram

To stop
mpdallexit

2. Evaluate a performance improvement of MatrixMult.java, using 1, 2, and 4 computing nodes.

```
mpdboot -n 4 -v
mpirun -n 1 MatrixMult 3000
mpirun -n 2 MatrixMult 3000
mpirun -n 4 MatrixMult 3000
mpdallexit
```

3. Related Materials

- To make a quick review for MPI Java, see the slides: p18-21 of [MPI.ppt](#)
- For details of MPI Java, refer to the following tutorial and specification.

1. <http://www.hpjava.org/courses/ar1/lectures/mpi.ppt>
2. <http://www.hpjava.org/reports/mpiJava-spec/mpiJava-spec.pdf>

4. What to Turn in

Turn in your execution output of MatrixMult with 1, 2, and 4 computing nodes.

1. Your execution output, (i.e., output.txt)