Lab Session

Rocks-A-Palooza I

Track 1

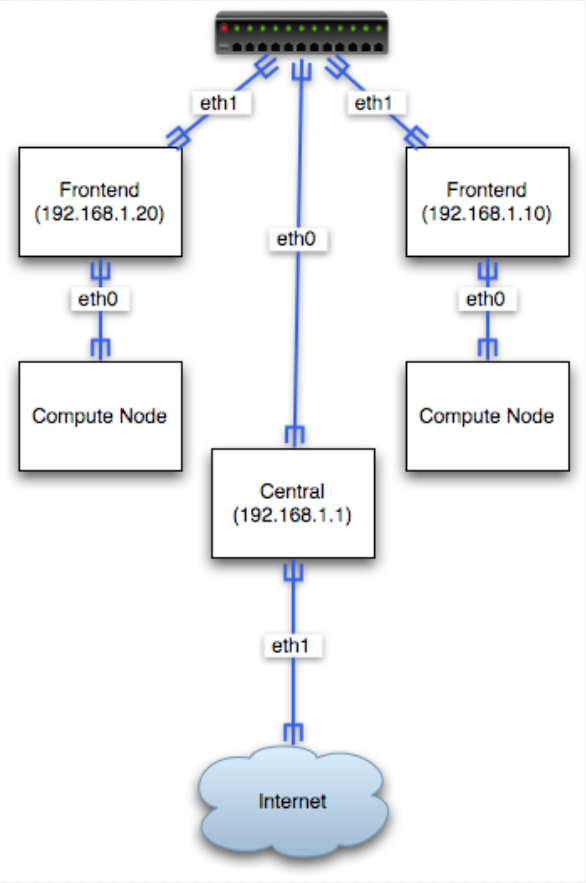
Session IV

SDSC

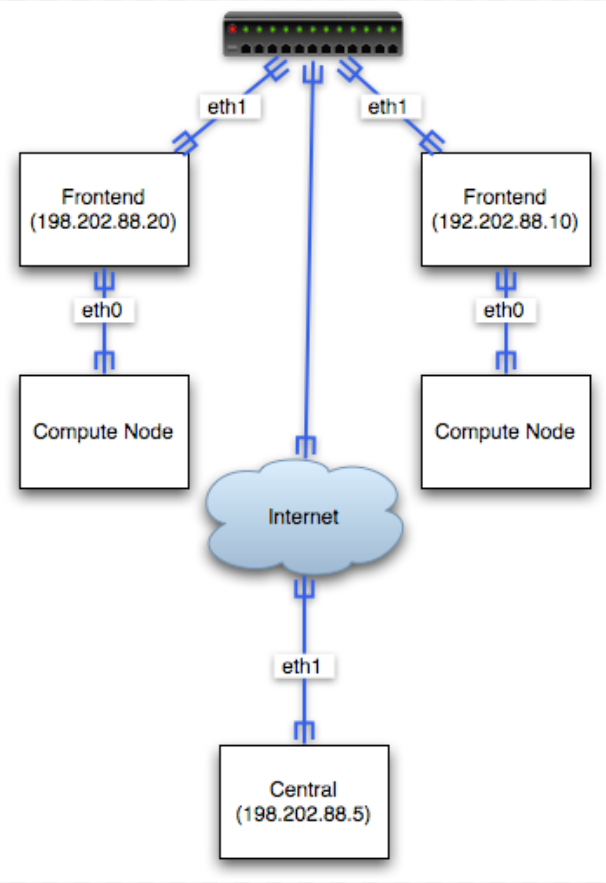
Cluster Building Time

- Break into Groups
- Every Group Grab
  - 2 Servers
  - 2 Power Cords
  - 2 Ethernet Cables
    - 1 long
    - 1 short
  - 1 Keyboard / Mouse
  - 1 Monitor
- Small Clusters
  - 1 frontend
  - 1 compute
  - 1 cross-over Ethernet cable (no switch)

Today's Lab Network



lab



reality

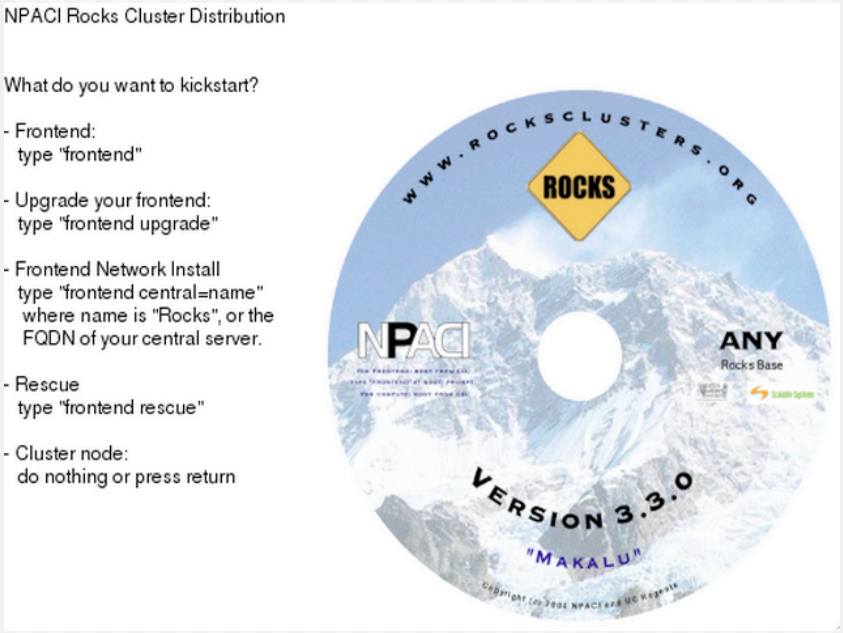
Network Information

- Frontend Addresses
  - 192.168.1.10
  - 192.168.1.20
  - 192.168.1.30
  - 192.168.1.40
  - 192.168.1.50
  - 192.168.1.60
  - 192.168.1.70
  - 192.168.1.80

IP Address	192.168.1.xx
Netmask	255.255.255.0
Gateway	192.168.1.1
Nameserver	198.202.75.26

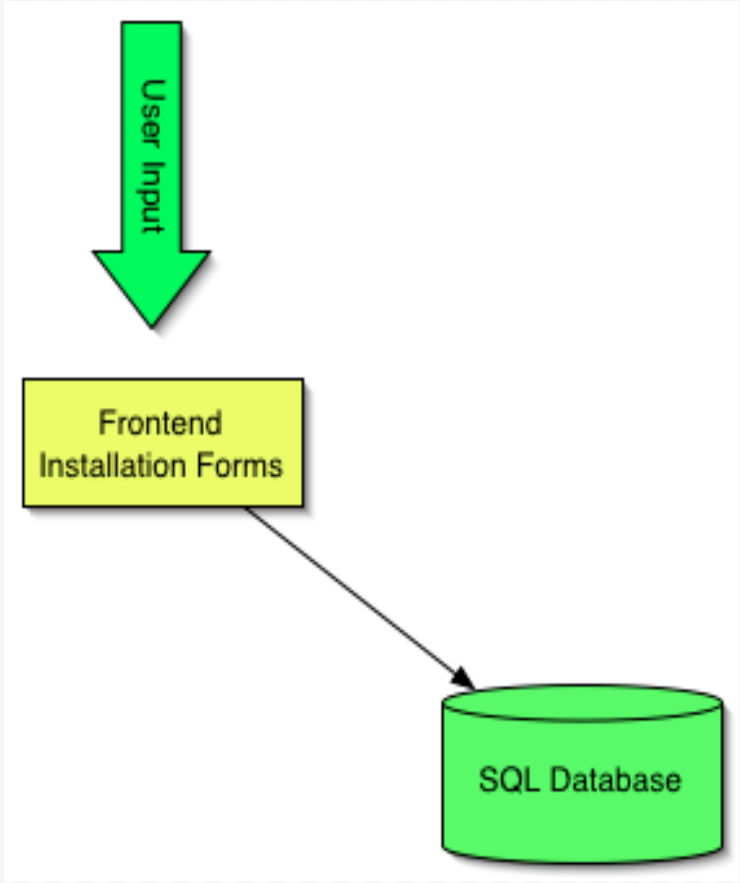
Start Installing Your Frontend

- Installation Methods
  - CDs
  - Central
- CD
  - Slow
  - Does not require a network
  - Type `frontend`
  - Left side of room
- Central
  - Fast
  - Requires a network
  - Type `frontend central=192.168.1.1`
  - Right side of room

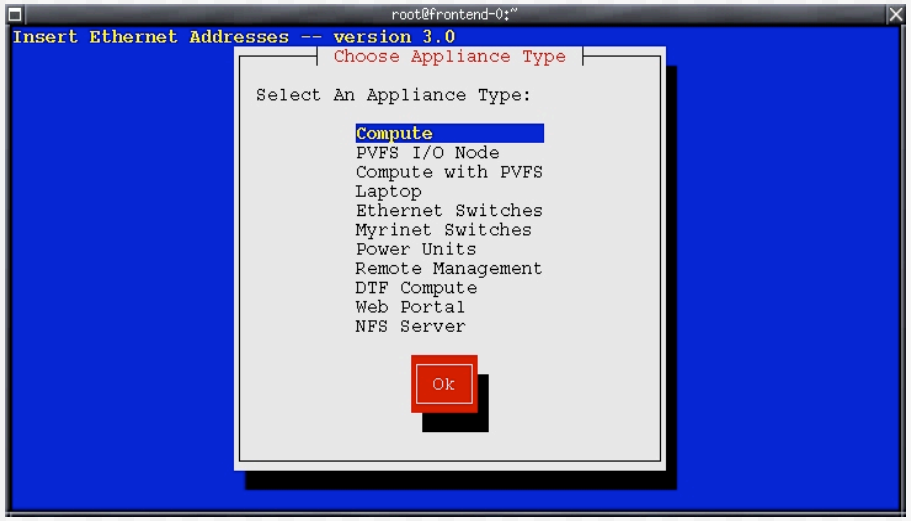


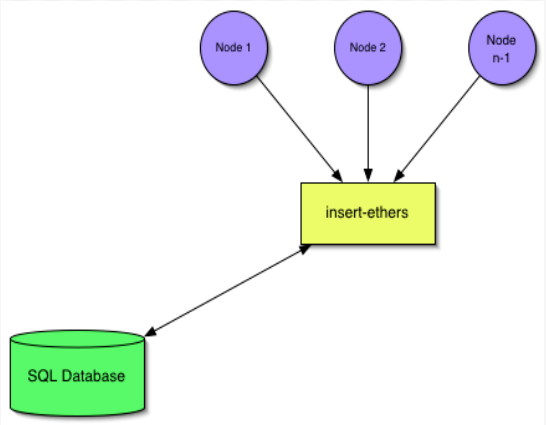
Interactive Screen

- Fill out the screens we just talked about
- Use the provided network information
- Choose your own password
- All information goes into the cluster database



Add Compute Node with Insert-ethers





- Collect the Ethernet MAC address of cluster nodes
- Only done once, during integration
- Populates cluster database

Open Lab

- Rocks-A-Palooza
  - Is about you guys
  - Other topics
  - Questions
- Adult Swim
  - Go nuts on your clusters
  - Globus
  - SGE
  - PBS
  - Configuration Graph

Simple MPI Program

```
1: #include <stdio.h>
2: #include "mpi.h"
3:
4: int
5: main(int argc, char *argv[])
6: {
7:         int     numprocs;
8:         int     myid;
9:         int     namelen;
10:        char    processor_name[MPI_MAX_PROCESSOR_NAME];
11:
12:        MPI_Init(&argc, &argv);
13:
14:        MPI_Comm_size(MPI_COMM_WORLD, &numprocs);
15:        MPI_Comm_rank(MPI_COMM_WORLD, &myid);
16:        MPI_Get_processor_name(processor_name, &namelen);
17:
18:        fprintf(stderr, "Process %d on %s\n", myid, processor_name);
19:
20:        MPI_Barrier(MPI_COMM_WORLD);
21:
22:        sleep(120);
23:
24:        MPI_Finalize();
25: }
```

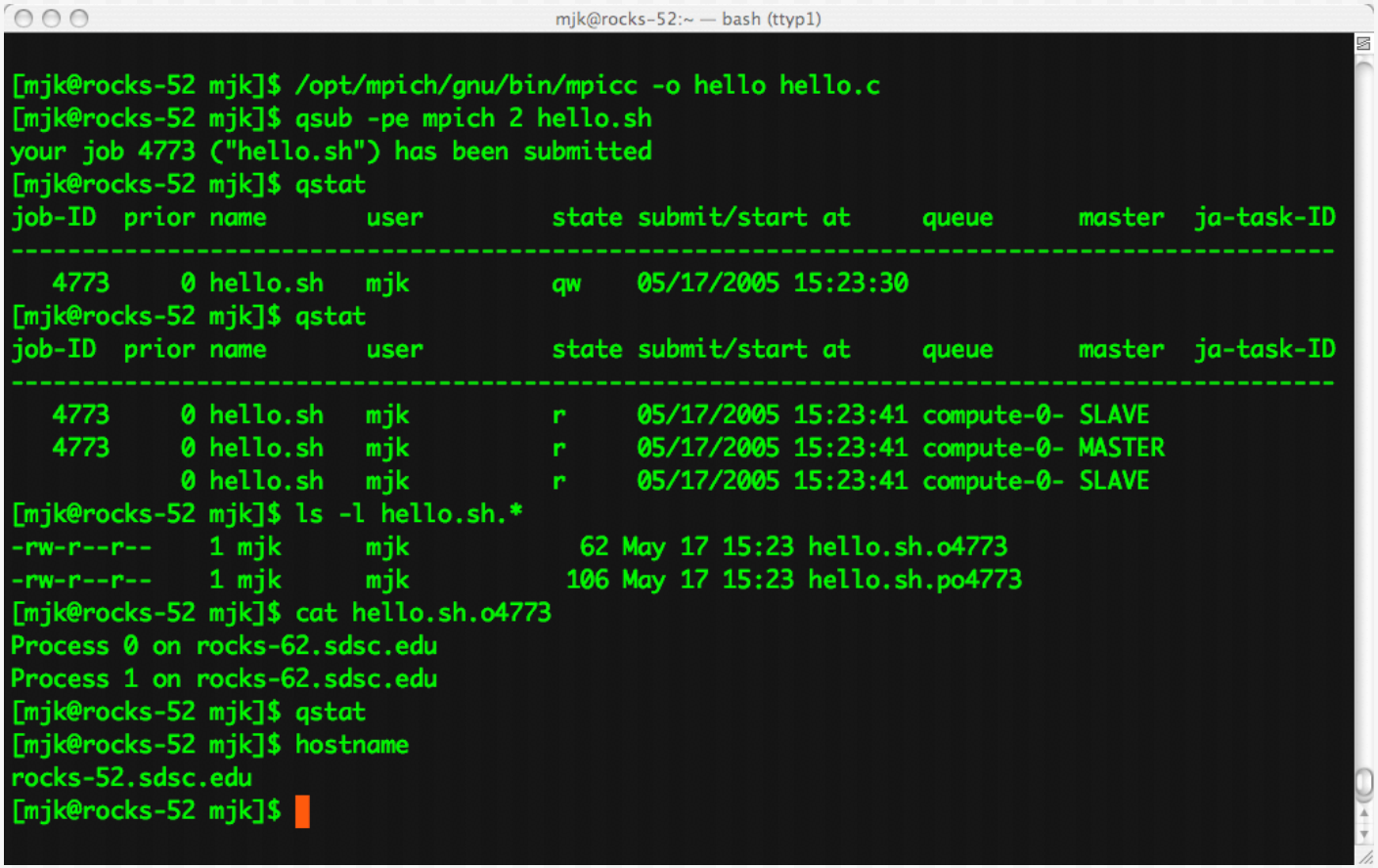
Simple MPI/SGE Submit Script

```
#! /bin/bash
#
#$ -cwd
#$ -j y
#$ -S /bin/bash

MPI_DIR=/opt/mpich/gnu

$MPI_DIR/bin/mpirun -np $NSLOTS -machinefile $TMPDIR/machines hello
```

Compile / Run

- Compile
  - `/opt/mpich/gnu/bin/mpicc -o hello hello.c`
- Run
  - `qsub -pe mpich 2 hello.sh`
- Monitor
  - `qstat`

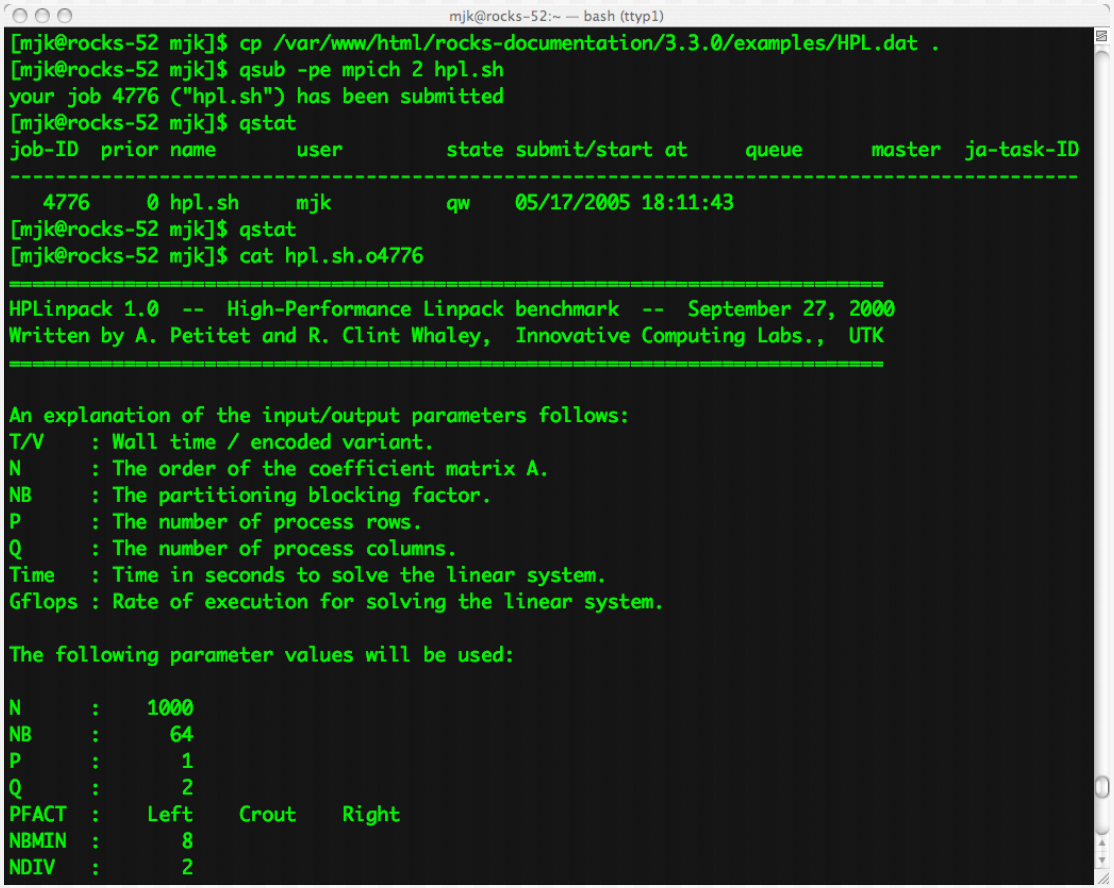
Example Run



HPL.dat

```
HPLinpack benchmark input file
Innovative Computing Laboratory, University of Tennessee
HPL.out      output file name (if any)
6            device out (6=stdout,7=stderr,file)
1            # of problems sizes (N)
1000 Ns
1            # of NBs
64 NBs
1            # of process grids (P x Q)
1 Ps
2 Qs
16.0         threshold
3            # of panel fact
0 1 2            PFACTs (0=left, 1=Crout, 2=Right)
1            # of recursive stopping criterium
8            NBMINs (>= 1)
1            # of panels in recursion
2            NDIVs
1            # of recursive panel fact.
2            RFACTs (0=left, 1=Crout, 2=Right)
1            # of broadcast
1            BCASTs (0=1rg,1=1rM,2=2rg,3=2rM,4=Lng,5=LnM)
1            # of lookahead depth
1            DEPTHs (>=0)
2            SWAP (0=bin-exch,1=long,2=mix)
80           swapping threshold
0            L1 in (0=transposed,1=no-transposed) form
0            U  in (0=transposed,1=no-transposed) form
1            Equilibration (0=no,1=yes)
8            memory alignment in double (> 0)
```

Example HPL Run



Linpack Scaling

- Then edit ‘HPL.dat’ and change:
  - 1 Ps
  - To:
    - 2 Ps
  - The number of processors Linpack uses is P * Q
- To make Linpack use more memory (and increase performance), edit ‘HPL.dat’ and change:
  - 1000 Ns
  - To:
    - 4000 Ns
  - Linpack operates on an N * N matrix
- Submit the (larger) job:
  - `qsub qsub-test.sh`

Others Tasks

- Globus
  - See grid roll usersguide
  - Setup user keys
  - `globus-job-run localhost /bin/hostname`
  - `globus-job-run localhost/jobmanager-sge`
- Adding RPMs to nodes
  - See usersguide for graph instructions
- Rebuild with Central/CDROM

Questions?