Tutorial 4

From ACE Lab

Team Name: _____

Part 1 - NTP

NTP enables you to synchronise the time across all the computers in your cluster. Some applications require that time be properly synchronised to prevent warnings or errors. Torque needs host names to match the FQDN for the host. If you haven't done so already, set the hostname in the /etc/sysconfig/network file and reboot.

On the head node:

1. Edit ntp.conf, add:

```
restrict 192.168.0.0 mask 255.255.255.0 nomodify notrap
```

2. Set NTP to start on boot and start the service

3. Use "ntpq -p" to monitor the sync state

On the nodes:

4. Edit ntp.conf, point server to the headnode, remove the other time servers, set the NTP service to start on boot and start the service.

5. Use "ntpq -p" to monitor sync state

Part 2 - Torque Server

QUESTION 1:
What role does the scheduler play in a cluster?

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On the head node:

1. Download, extract:

```
http://www.adaptivecomputing.com/support/download-center/torque-download/
```

2. Install dependencies:

```
yum install gcc-c++ openssl-devel libxml2-devel
```

3. Compile Torque

4. Copy init scripts and set them to start on boot

```
cp contrib/init.d/pbs_server /etc/init.d/pbs_server
cp contrib/init.d/pbs_sched /etc/init.d/pbs_sched
cp contrib/init.d/trqauthd /etc/init.d/trqauthd
```

```
chkconfig pbs_trqauthd on
chkconfig pbs_sched on
chkconfig pbs_server on
```

5. Start the trqauthd service

6. Make sure the PATH variable contains:

```
/usr/local/bin/
/usr/local/sbin/
```

7. Update the library path:

```
echo '/usr/local/lib' > /etc/ld.so.conf.d/torque.conf
ldconfig
```

8. Make RPM packages (make packages)

9. Execute

```
./torque.setup root
```

10. Edit /var/spool/torque/server_priv/nodes and add nodes, example:

```
node01 np=2
```

11. Start the pbs_server service

Part 3 - Torque Client

On the compute node:

1. Copy over the packages generated in Part 2 and install them

```
./torque-package-mom-linux-x86_64.sh  --install
./torque-package-clients-linux-x86_64.sh --install
```

QUESTION 2:
What are packages? Name the two most common standards.

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2. Update the library path:

```
echo '/usr/local/lib' > /etc/ld.so.conf.d/torque.conf
ldconfig
```

3. Copy the init scripts and set them to start after boot

4. Start the trqauthd service

5. Edit /var/spool/torque/mom_priv/config and add:

```
$pbsserver     headnode       # hostname running pbs server
$logevent      225            # bitmap of which events to log
$usecp *:/home /home
```

6. Start the pbs_mom service

7. On the server check the nodes

```
pbsnodes -a
qstat -q
qmgr -c 'p s'
```

8. submit a job

```
echo "sleep 30" | qsub
```

9. Display the queue

```
qstat
```

Part 4 - HPL

The High Performance LINPACK benchmark is a measure of a system's floating point computing power. The resulting score in FLOPS is often used to roughly quantify the performance of a HPC system.

1. Install OpenMPI

```
yum install openmpi-devel atlas-devel
```

2. Download and extract HPL:

```
http://www.netlib.org/benchmark/hpl/
```

3. Make sure the hpl root dir is called "hpl"

4. Copy makefile

```
cp setup/Make.Linux_PII_CBLAS_gm .
```

5. Edit the Makefile and Change LDdir to:

```
/usr/lib64/atlas
```

7. Compile:

```
make arch=Linux_PII_CBLAS_gm
```

8. Execute xhpl on localhost:

```
mpirun -np <cores> xhpl
```

A (much) higher result is possible if you compile GCC, OpenMPI and ATLAS from source, rather to from repos.

QUESTION 3:
Explain the difference between shared and distributed memory systems.

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