COMP605/CS605

1 Guidelines

1. Use VPN to login via ssh or putty
2. Change password: passwd
3. No jobs/applications run on head node - jobs on head nodes will be deleted/killed
4. Request all of the processors on one node, in our case 16 (performance wise)

1.1 PBS Batch-system

The batch-system is used to submit jobs/applications to the scheduler/queue. As soon as the resources are available the scheduler runs the job from the queue. It is important to understand, that batch-script only runs the job/application on the requested node!

The following example shows how to use the batch-system for an application `hello.c`. You can find the `hello.c` application in the example directory in your directory. The `hello.c` application prints the hostname.

1. Create executable of application with gcc (`gcc -o hello.c hello`) or makefile
2. Check available nodes: `pbsnodes` , the follwing code shows the output of pbsnodes

```
$ [test@tuckoo ~] pbsnodes
node10
     state = free
     power_state = Running
     np = 16
     properties = p100,host10
     ntype = cluster
     status = rectime=1677091846,cpuclock=Fixed,varattr=,jobs=,state=
    free,netload=2399008204,gres=,loadave=0.00,ncpus=16,physmem
    =131908132kb,availmem=320732556kb,totmem=322237688kb,idletime
    =770246,nusers=2,nsessions=5,sessions=1671 1680 1681 1693 1907,
    uname=Linux node10 4.18.0-425.10.1.el8_7.x86_64  1 SMP Thu Jan 12
    11:31:50 PST 2023 x86_64,opsys=linux
     mom_service_port = 15002
     mom_manager_port = 15003
```

```
...
...
...
...
...
node13
     state = free
     power_state = Running
     np = 16
     properties = core16,mpi,host13
     ntype = cluster
     status = rectime=1677091843,cpuclock=Fixed,varattr=,jobs=,state=
    free,netload=71447182491,gres=,loadave=0.00,ncpus=16,physmem
    =65901576kb,availmem=131945748kb,totmem=133010436kb,idletime
    =1184408,nusers=0,nsessions=0,uname=Linux node13 5.15.0-5.76.5.1.
    el8uek.x86_64 2 SMP Fri Dec 9 17:44:32 PST 2022 x86_64,opsys=linux
     mom_service_port = 15002
     mom_manager_port = 15003
```

Listing 1: pbsnodes output on terminal

3. Modify batch-script (`batch.hello`) to request all cores of a specific node (see on line 17, Listing 2). In that case we request node 13 with all 16 cores. The 1 stands for 1 node, 16 for 16 cores, and host13 is the generic property of the specific node (see on line 21, Listing 1).

```
[test@tuckoo examples]$ cat batch.hello
#!/bin/sh
# batch.hello -- this example "serial" batch script requests
# runs 2 processes on a single "mpi" node...
# here, the "mpirun" command is a helper to fan-out the 2 processes
# this script runs on an allocated node and mpirun fans out the
# application threads to a "list" of allocated nodes...

# for more info on requesting specific node resources see
# "man pbs_resources"

# to be submitted via the qsub command,
# as in, "qsub batch.hello"

# the following are pbs/torque batch directives:
#PBS -V
#PBS -l nodes=1:ppn=2:mpi
#PBS -N hello
#PBS -j oe
#PBS -q batch

# the following commands are run on a select node:
cd $PBS_O_WORKDIR
echo "batch.hello: running hello-test..."
NCORES=`wc -w < $PBS_NODEFILE`
HOST=`hostname`
echo "batch.hello: running $NCORES processes from $HOST"
```

```
28 echo "batch.hello: cat-ing PBS nodes file:"
29 cat $PBS_NODEFILE
30 echo "application output follows..."
31 echo "-------------------------------------------------------------"
32 mpirun -np 2 -machinefile $PBS_NODEFILE ./hello
```

Listing 2: cat batch.hello output on terminal

4. Submit pbs batch-script: qsub batch.hello
5. Check job status: qstat -n

If there are multiple request of the same node, the job/application will be queued. You can check the status of your job with `qstat -n`.