SGE - QSUB – User Guide

The following is a guide for all users of Fotcluster1 & Fotcluster2 who will need to use the SGE QSUB job scheduler for the submission of all jobs.

What is qsub?

Qsub is the command used for job submission to the cluster. It takes several command line arguments and can also use special directives found in the submission scripts or command file. Several of the most widely used arguments are described in detail below.

What does qsub do?

Overview

Both clusters have Sun Grid Engine (SGE) installed as the job management and job scheduler.

Sun Grid Engine is responsible for accepting, scheduling, dispatching, and managing the remote and distributed execution of large numbers of parallel user jobs. It also manages and schedules the allocation of distributed resources such as processors, memory, disk space, and software licenses.

Commands

There are three common commands for using the SGE:

- **qsub** Submit a job to the queue to be run
- **qstat** See the status of the queue
- **qdel** Delete a job from the queue

A job is a script that sets up necessary parameters and then executes programs on the node(s) allocated

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Submitting a Job

The format of the qsub command is:

qsub **script_file**

where **script_file** is a <u>text file</u> containing, among other things:

- the name of your executable program

NOTE: the operand to the qsub command <u>**MAY NOT BE**</u> an executable program.

> **WRONG:** qsub my_executable_program.
> **For example**: qsub a.out

Doing so will result in your program not running.

When you submit your job it will be assigned a job id and should **APPEAR** if you immediately do a qstat command.

The following is an example of a correctly laid out PBS batch script for running an MPI job (the script is the top set of nine lines, and is explained in the bottom set of nine lines):

```
#!/bin/bash
#$ -A pmills
#$ -S /bin/bash
#$ -M pmills@fotcluster2.local
#$ -P socm_proj
#$ -m beas
#$ -cwd
#$ -pe mpi 4

. /etc/profile.d/modules.sh

module load openmpi-x86_64

#cp $TMPDIR/machines machinefile
mpirun -machinefile $TMPDIR/machines -np $NSLOTS waveFoam -parallel
```

How long can my job run

There is no limit to how long your job can run, although it is assumed that you would have a good idea how long the job is lightly to take to complete.

If the job therefore runs beyond this time period the job should be stopped.

Please bear in mind that whilst your job is running it is consuming resources, which may prevent others from running their job.

Monitoring a Job

SGE allows users and administrators to monitor submitted jobs with the qstat command. If the command is run by a non-administrative user, it will output just that user's jobs. For example:

> qstat

```
Job id          Name            User            Time Use S Queue
--------------- --------------- --------------- -------- - -----
4807            scatter         user01          12:56:34 R batch
```

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Cancelling a Job

To cancel a submitted jobs we need to use the QDEL command.
The only parameter required is the ID of the job to be cancelled.

> qdel 4807

```
Job id          Name            User            Time Use S Queue
--------------- --------------- --------------- -------- - -----
4807            scatter         user01          12:56:34 R batch
                                                      $
```

Summary of SGE Commands

SGE commands and their functions are as follows:

Function	PBS example
submit a batch job to a queue	qsub script_name
delete (cancel) a queued job	qdel _JOBID
show details of the nodes running	qstat -f
Display information only on those jobs and queues being associated with the users from the given user list.	qstat –u
Displays status information with respect to queues to which the specified users have access	qstat -U