Submitting a job

Jobs are submitted with the `qsub` command:

```
$ qsub options job-script
```

The options tell Torque information about the job, such as what resources will be needed. **These can be specified in the job-script as PBS directives, or on the command line as options, or both** (in which case the command line options take precedence should the two contradict each other). For each option there is a corresponding PBS directive with the syntax:

```
#PBS option
```

For example, you can specify that a job needs 2 nodes and 8 cores on each node by adding to the script the directive:

```
#!/bin/bash
#PBS -l nodes=2:ppn=8
```

or as a command-line option to `qsub` when you submit the job:

```
$ qsub -l nodes=2:ppn=8 my_script.q
```

Options for running interactively on the compute nodes:

- `-I`
  Don’t just submit the job, but also wait for it to start and connect `stdout`, `stderr` and `stdin` to the current terminal.
- `-X`
  Enable X forwarding, so programs using a GUI can be used during the session (provided you have X forwarding to your workstation set up)
- `-V`
  Pass the current environment to the interactive batch job
- To leave an interactive batch session, type `exit` at the command prompt.

Options for many similar jobs (array jobs and `pbsdsh`):

- `-t 1,10,50-100`
  Submit an array of jobs with array ids as specified. Array ids can be specified as a numerical range, a comma-separated list of numbers, or as some combination of the two. Each job instance will have an environment variable `$PBS_ARRAYID`
- `-t 1,10,50-100%5`
  As above, but the appended ‘%n’ specifies the maximum number of array items (in this case, 5) which should be running at one time
- Submit a single “shepherd” job requesting multiple processes and from it start individual jobs with `pbsdsh`. 