

Interactive sessions on a Compute Node on Lengau

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When a user (with username johnsmith, for example) logs into lengau.chpc.ac.za, they see the following prompt:

```
johnsmith@login2 ~]$
```

This means that they are on login node 2. There is also a login node 1 (*scp.chpc.ac.za*), which is intended for copying files to and from the cluster, and as a backup login node. The login nodes are like the reception areas of a business or factory. You can go to reception to schedule a meeting or book a room, but shouldn't do actual work there. Holding a board meeting in the reception area will probably stop customers from entering the building, while treating the area as a workshop or lab and using powertools and hammers will be even more disruptive and perhaps unsafe for visitors!

In the same way, using the login node to submit jobs or move files around is all right, but doing resource-intensive computations on them may stop other users from accessing the cluster. In addition, the login nodes are not particularly powerful relative to the compute nodes, and actually have a little less memory.

So suppose you need to do something that is resource-intensive, but not easily automated on the cluster? Perhaps you need to compile a piece of software that you need, or you need to manually test each step in a process before automating it, or to troubleshoot it.

To allow for these sorts of operations, the CHPC allows you to request an *interactive session* on a compute node. Rather than submitting a fire-and-forget job script which will run on some or other compute node, an interactive session logs you onto one (or more) compute nodes and lets you type in commands or run software directly. By default, the session will expire and log you out after 1 hour. You will then return to the login node from

which you submitted the qsub command.

If only a single core is required for a short period (an hour or less), the following command will suffice (obviously, you need to replace MECH1234 with your own project short-code):

```
qsub -I -P MECH1234 -q serial
```

You should then see a prompt something like this:

```
johnsmith@cnode0052 ~]$
```

This means that you are now logged into a compute node, and can run whatever commands you would normally do. *You should note, however, that you will begin the interactive session in your home directory, irrespective of what directory you were in when you submitted the qsub request.*

Can you use “sudo” in an interactive session? No, unfortunately not - the CHPC system is a national facility, and we can’t give super-user permissions to our users, in case something is broken or even deliberately misused. Even most CHPC staff don’t have sudo-rights!

If you want to use a full node (24 cores) for a longer period (say, four hours), you specify some of the other parameters via a -l flag:

```
qsub -I -P MECH1234 -q smp -l select=1:ncpus=24,walltime=4:00:00
```

Note that here you must use the “smp” queue rather than the “serial” queue. “select=1” Specifies that you wish to use a single node, and “ncpus=24” that you want to use all 24 available cores on that node. If you request less, you may end up sharing the node with another user - which should not be a problem, unless you require the full memory of the node.

If you have to use interactive sessions regularly, it is worth putting the above command into a script file (modified as necessary to your purposes, with your project short code, etc.):

```
#!/bin/bash
qsub -I -P MECH1234 -q smp -l select=1:ncpus=24,walltime=4:00:00
```

Save the above script in your home directory as “qsubi.sh” or some similar sensible name. Then run this command to make it executable:

```
chmod +x ~/qsubi.sh
```

After this, whenever you want an interactive session, you have only to type:

```
~/qsubi.sh
```

It is possible to request more than a single node for interactive use, but it is seldom necessary (unless you are testing a piece of parallel code across more than one node, for instance).

What happens if you request more than 24 cores per node? There are no *normal* compute nodes that have more than 24 cores, so unless you specifically request a special node that does have at least 25 cores, the job-scheduler will endlessly and fruitlessly look for such a node, and your interactive session will never start.

One warning regarding interactive sessions: when you log out, the session ends, and any information that was not saved to a file on disk will vanish. This also happens if your network connection dies and you lose the connection to the cluster. Therefore any long-duration task of more than a few hours should not ideally be done by an interactive session. In later lessons, you will be shown how to write a job-script, which will run, regardless of whether you are logged into the HPC system or not.