

## Campus Cluster Quick Start Guide

1. Before you start, you need a campus cluster account. It can be requested at [https://campuscluster.illinois.edu/new\\_forms/user\\_form.php](https://campuscluster.illinois.edu/new_forms/user_form.php). It usually takes about a day or two to hear back from them.
2. Install an SSH Client. The one I have is called Bitvise, downloaded from here: <https://www.bitvise.com/download-area>.
3. After you download and open the client, all you have to enter is a Host name (cc-login.campuscluster.illinois.edu) and your own university username and password. Click 'Log In' to connect.
4. Two new windows will open: a) an SFTP GUI window that lets you transfer files between your local machine and your own personal folder in the online cluster storage, and b) an xterm window that looks like command prompt, and here is where you will be entering all commands.
5. In the SFTP window transfer the code files that you'd like to run to your cluster folder (you only have 2GB of storage). There is a folder called 'scratch' that has a much larger capacity but it gets scrapped every 24 hours, so it could be useful for storing large files short-term.
6. In the xterm window, you need to manually load all the modules that you're planning to use (such as python or anaconda). To see a list of all available modules, type 'module avail'. To see a list of all loaded modules, type 'module list'. To load a specific module, get its exact name from 'module avail' and type 'module load [modulename]'.  
7. To create a new virtual env using anaconda, first load anaconda through 'module load anaconda/3' then type 'conda create -n py36 python=3.6' if you want to create a python 3.6 virtual env. To activate the new env, type 'source activate py36'.
8. Install all your packages as usual and test out your scripts using 'python scriptname.py' in the terminal to make sure everything works before creating a cluster batch job.
9. To officially create cluster batch jobs you need to have a batch script that references the python scripts that you'd like to run. For example, if we want to run a python file called 'add2num.py', its batch script will look like:

```
#!/bin/bash
#
#####
#
#PBS -l walltime=00:05:00
#PBS -l nodes=2,flags=allprocs
#PBS -N python_add_numbers
#PBS -q secondary
#PBS -j oe
#
#####
```

```
# Change to the directory from which the batch job was submitted
cd $YourFolder

# Load newer version of Python into user environment
module load python/3
module load anaconda/3

# Activate virtual env
source activate py36

# Run python code
python3 add2num.py
```

The batch script has to have the extension (.pbs). For example: 'batch\_script\_name.pbs'. The batch options (walltime, nodes, flags, etc.) that determine everything about the run such as requested running time and number of computational nodes are explained here: <https://campuscluster.illinois.edu/resources/docs/user-guide/#jobs>.

10. Now that you have your batch file, you can submit your jobs to the cluster using the 'qsub command'. The syntax for qsub is: qsub [list of qsub options] script\_name . In our case, simply write 'qsub batch\_script\_name.pbs' to run the batch file that we created that contains all the options we want and references the python script that we want to run.

11. The results will be stored in a new file with a name like 'batch\_script\_name.pbs.o8096746', and should look like:

```
-----
Begin Torque Prologue (Fri Jan 25 17:44:09 2019)
Job ID:          8096747.cc-mgmt1.campuscluster.illinois.edu
Username:        userab2
Group:           huytran1-ae-eng
Job Name:        Q-Table-Learning.pbs
Limits:          walltime=00:30:00,nodes=1:ppn=12,neednodes=1:ppn=12
Job Queue:       secondary
Account:         eng-research
Nodes:           golub096
End Torque Prologue
-----

Score over time: 0.5225
Final Q-Table Values
[[2.37586294e-01 1.79776544e-03 2.59089783e-03 2.71567777e-03]
 [8.76829519e-04 3.02515029e-04 4.68838692e-04 7.94109329e-02]
 [1.27740923e-01 6.21968736e-04 1.27753976e-03 3.41519735e-03]
 [5.96274511e-04 1.86890261e-03 1.00421139e-03 3.42333498e-03]
 [3.12685102e-01 2.66065981e-04 4.44178112e-04 9.43502817e-04]
 [0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00]
 [2.58277055e-02 2.73078967e-05 5.73589536e-04 1.04402783e-08]
 [0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00]
 [3.53222335e-04 6.72691291e-04 1.44057565e-04 4.37284601e-01]
 [0.00000000e+00 7.05329802e-01 6.56509416e-04 1.32278989e-03]
 [1.85121541e-01 2.57687301e-05 1.40766524e-03 7.85191974e-05]
 [0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00]
 [0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00]
 [0.00000000e+00 0.00000000e+00 9.02644999e-01 1.32020656e-03]
```

```
[0.00000000e+00 0.00000000e+00 6.58073696e-01 0.00000000e+00]  
[0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00]]
```

-----  
Begin Torque Epilogue (Fri Jan 25 17:44:25 2019)

Job ID: 8096747.cc-mgmt1.campuscluster.illinois.edu

Username: karlht2

Group: huytran1-ae-eng

Job Name: 01-Q-Table-Learning-Clean.pbs

Session: 85894

Limits: walltime=00:30:00,nodes=1:ppn=12,neednodes=1:ppn=12

Resources:

cput=00:00:07,vmem=0kb,walltime=00:00:16,mem=0kb,energy\_used=0

Job Queue: secondary

Account: eng-research

Nodes: golub096

End Torque Epilogue

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