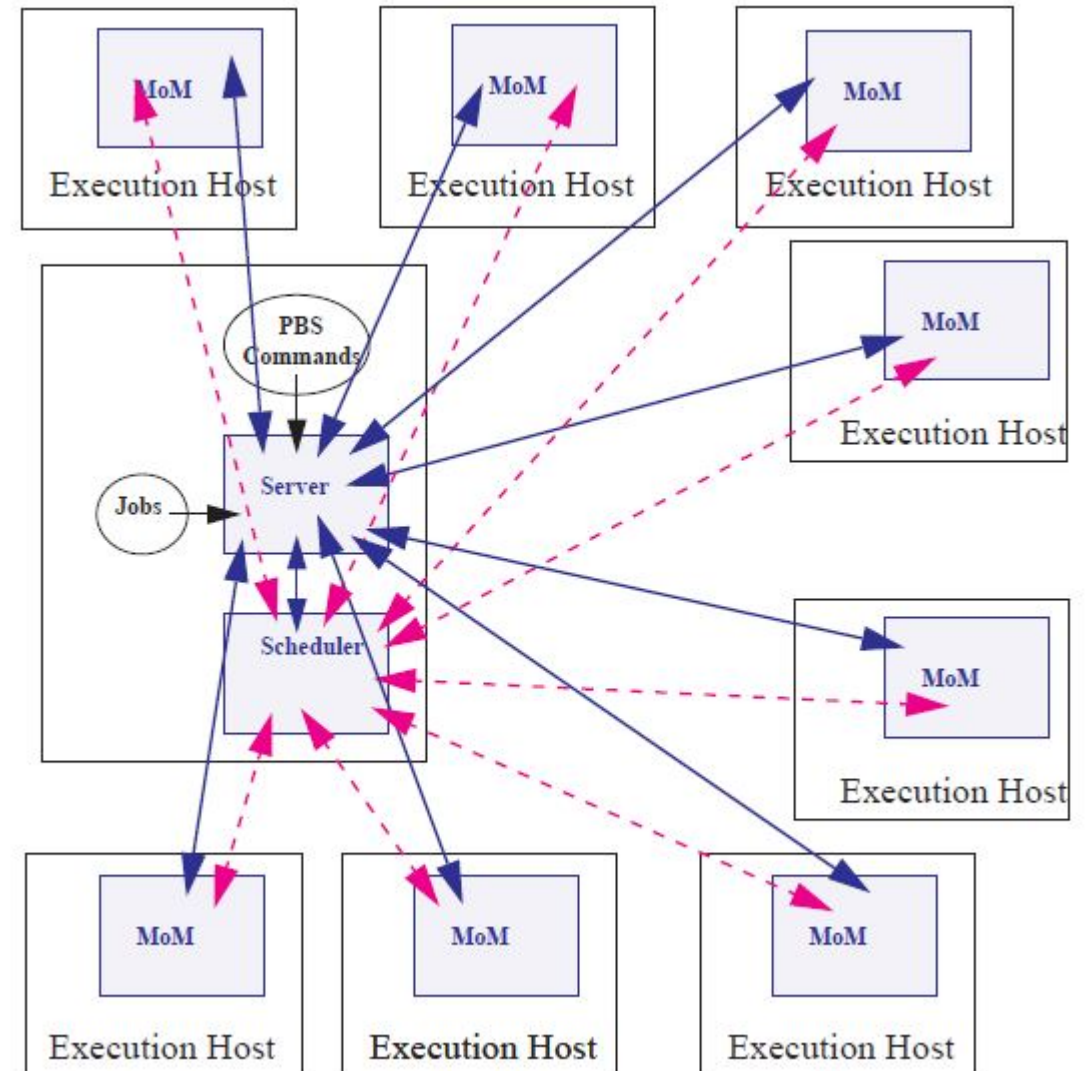


Torque Scheduler

- Portable Batch System (PBS) :
a software which is used in cluster computing to schedule jobs on multiple nodes.
- Terascale Open-source Resource and QUEue Manager (TORQUE)



Submitting a job

1. Script (R Script/matlab/python/etc)
2. PBS file

Step 1: _____.

Step 2: _____.

Step 3: Profit.



PICK 2

R script (demo.r)

```
args = commandArgs(trailingOnly=TRUE)
```

```
nsim <- as.numeric(args[1])
```

```
mean <- as.numeric(args[2])
```

```
sd <- as.numeric(args[3])
```

```
dir <- '~/project-stat/PSS_ICC/'
```

```
temp <- rnorm(nsim, mean, sd)
```

```
write.csv(temp, paste0(dir,"temp_",mean))
```

Simple PBS File

From: "Qu, Peiyong" <anniequ@illinois.edu>

Subject: Running campus clusters

Date: November 5, 2018 at 15:44:24 CST

To:

Cc: "Chen, Xiaohui" <xhchen@illinois.edu>

Dear xxx,

I notice that two of you are using more than 2 stat nodes at the same time these days, one is using 7 nodes. Since we have limited nodes in our dept., could you please restrict yourself to use two nodes at the same time. Note that each node has multiple cores, 12-24 cores, you should have enough cores even with 2 nodes.

Thanks,

[For more details on other PBS directives](#)

Submit PBS files

- Secondary Queue

qsub my_pbs_file.pbs

```
robintu2@golubh4(-bash): ~ > pbsnodes | grep properties | grep stat
properties = golub,128G,m128G,Ethernet,NoGPU,E2670_ET_128G_NoGPU,E2670,hept3,stat
properties = golub,128G,m128G,Ethernet,NoGPU,E2670_ET_128G_NoGPU,E2670,hept3,stat
properties = golub,128G,m128G,Ethernet,NoGPU,E2670_ET_128G_NoGPU,E2670,hept3,stat
properties = golub,128G,m128G,Ethernet,NoGPU,E2670_ET_128G_NoGPU,E2670,hept3,stat
properties = golub,256G,m256G,Ethernet,NoGPU,E2680V3,E2680V3_ET_256G_NoGPU,hept3,stat
properties = golub,256G,m256G,Ethernet,NoGPU,E2680V3,E2680V3_ET_256G_NoGPU,hept3,stat
properties = golub,256G,m256G,Ethernet,NoGPU,E2680V3,E2680V3_ET_256G_NoGPU,hept3,stat
properties = golub,256G,m256G,Ethernet,NoGPU,E2680V3,E2680V3_ET_256G_NoGPU,hept3,stat
properties = ccc,256G,m256G,Ethernet,K80,E2680V4_ET_256G_K80,E2680V4,stat
properties = ccc,256G,m256G,Ethernet,K80,E2680V4_ET_256G_K80,E2680V4,stat
```

- Stat Queue

qsub -q stat my_pbs_file.pbs

Job Status

- `qstat -a stat`

```
robintu2@golubh4(-bash): ~ > qstat -a stat
```

```
cc-mgmt1.campuscluster.illinois.edu:
```

Job ID	Username	Queue	Jobname	SessID	NDS	TSK	Req'd Memory	Req'd Time	S	Elap Time
7954684.cc-mgmt1.campu	nute2	stat	rax_gp5	115703	1	16	--	144:00:00	R	38:48:46
7965181.cc-mgmt1.campu	yanqingz	stat	Main.pbs	92920	1	16	--	150:00:00	R	27:52:46
7965298.cc-mgmt1.campu	shiwei	stat	lanzi	94296	1	6	--	168:00:00	R	26:45:26
7966081.cc-mgmt1.campu	yanqingz	stat	Main1.pbs	173731	1	16	--	150:00:00	R	24:31:20
7967093.cc-mgmt1.campu	changbo2	stat	sample.pbs	169980	1	22	--	72:00:00	R	18:49:11
7967135.cc-mgmt1.campu	myu17	stat	ita0.5_df10_t	14150	1	12	--	150:00:00	R	12:56:33
7968862.cc-mgmt1.campu	whuang42	stat	ml_100k_v8.pbs	105887	1	4	--	100:00:00	R	02:59:36
7970522.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_c	189974	1	1	--	08:00:00	R	02:22:17
7970523.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_c	190057	1	1	--	08:00:00	R	02:22:17
7970524.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_c	190185	1	1	--	08:00:00	R	02:22:17
7970525.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_c	190239	1	1	--	08:00:00	R	02:22:16
7970526.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_c	190549	1	1	--	08:00:00	R	02:22:16
7970527.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_c	190453	1	1	--	08:00:00	R	02:22:16
7970528.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_c	190792	1	1	--	08:00:00	R	02:22:15
7970529.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_c	190666	1	1	--	08:00:00	R	02:22:15
7970530.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_c	190981	1	1	--	08:00:00	R	02:22:14
7970531.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_c	191193	1	1	--	08:00:00	R	02:22:14

```
robintu2@golubh4(-bash): ~ > qstat -a stat | head
```

```
cc-mgmt1.campuscluster.illinois.edu:
```

Job ID	Username	Queue	Jobname	SessID	NDS	TSK	Req'd Memory	Req'd Time	S	Elap Time
7954684.cc-mgmt1.campu	nute2	stat	rax_gp5	115703	1	16	--	144:00:00	R	38:51:16
7965181.cc-mgmt1.campu	yanqingz	stat	Main.pbs	92920	1	16	--	150:00:00	R	27:55:16
7965298.cc-mgmt1.campu	shiwei	stat	lanzi	94296	1	6	--	168:00:00	R	26:47:56
7966081.cc-mgmt1.campu	yanqingz	stat	Main1.pbs	173731	1	16	--	150:00:00	R	24:33:50
7967093.cc-mgmt1.campu	changbo2	stat	sample.pbs	169980	1	22	--	72:00:00	R	18:51:41

```
robintu2@golubh4(-bash): ~ > on_stat
```

```
shiwei 1
nute2 1
whuang42 1
myu17 3
yanqingz 2
changbo2 1
yujiad2 43
robintu2@golubh4(-bash): ~ >
```

7970576.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	117091	1	1	--	08:00:00	R	01:46:38
7970577.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	117796	1	1	--	08:00:00	R	01:42:56
7970578.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	148696	1	1	--	08:00:00	R	01:40:42
7970579.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	122060	1	1	--	08:00:00	R	02:08:41
7970580.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	143645	1	1	--	08:00:00	R	02:06:32
7970581.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	143927	1	1	--	08:00:00	R	02:05:54
7970582.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	148730	1	1	--	08:00:00	R	01:40:42
7970583.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	149169	1	1	--	08:00:00	R	01:39:35
7970584.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	149450	1	1	--	08:00:00	R	01:38:34
7970585.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	122301	1	1	--	08:00:00	R	01:16:10
7970586.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	2333	1	1	--	08:00:00	R	00:58:28
7970587.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	2979	1	1	--	08:00:00	R	00:54:37
7970588.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	3729	1	1	--	08:00:00	R	00:50:17
7970589.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	--	1	1	--	08:00:00	Q	--
7970590.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	--	1	1	--	08:00:00	Q	--
7970591.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	662	1	1	--	08:00:00	R	02:01:59
7970592.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	966	1	1	--	08:00:00	R	02:00:58
7970593.cc-mgmt1.campu	yujiad2	stat	decompose_R_15_h	--	1	1	--	08:00:00	Q	--
7970629.cc-mgmt1.campu	myu17	stat	ita0.5_df10_t	18993	1	12	--	150:00:00	R	01:41:48
7970630.cc-mgmt1.campu	myu17	stat	ita0.5_df10_t	--	1	12	--	150:00:00	Q	--

```
robintu2@golubh4(-bash): ~ >
```

Your running jobs

qstat -u \$USER

```
robintu2@golubh4(-bash): ~/project-stat/PSS_ICC > qstat -u $USER
cc-mgmt1.campuscluster.illinois.edu:
Job ID      Username      Queue      Jobname      SessID  NDS      TSK      Req'd      Req'd      Elap
  ID                                     Memory    Time      State      Time
-----
7973828.cc-mgmt1.campu robintu2      secondar   cluster_demo_0  36561    1         2      limits: --    04:00:00    R    00:00:00
7973829.cc-mgmt1.campu robintu2      secondar   cluster_demo_1  70928    1         2      resources: -- 04:00:00    R    00:00:00
7973830.cc-mgmt1.campu robintu2      secondar   cluster_demo_2  80252    1         2      Job Queue: -- 04:00:00    R    00:00:00
```

Killing Jobs

```
qdel your_job_number
```

```
#kill all jobs
```

```
alias kill_all='qselect -u $USER | xargs qdel'
```


Completed jobs

```
robintu2@golubh4(-bash): ~/project-stat/PSS_ICC > current
```

```
cc-mgmt1.campuscluster.illinois.edu:
```

Job ID	Username	Queue	Jobname	SessID	NDS	TSK	Req'd Memory	Req'd Time	S	Elap Time

7973828	cc-mgmt1.campu	robintu2	secondar	cluster_demo_0	36561	1	2	--	04:00:00	C --
7973829	cc-mgmt1.campu	robintu2	secondar	cluster_demo_1	70928	1	2	--	04:00:00	C --
7973830	cc-mgmt1.campu	robintu2	secondar	cluster_demo_2	80252	1	2	--	04:00:00	C --

```
robintu2@golubh4(-bash): ~/project-stat/PSS_ICC > ls -l temp*
```

```
-rw-rw----+ 1 robintu2 stat 2312 Dec  6 23:50 temp_0  
-rw-rw----+ 1 robintu2 stat 2254 Dec  6 23:50 temp_1  
-rw-rw----+ 1 robintu2 stat 2204 Dec  6 23:50 temp_2
```

File output

- Print to console

results sent to wherever your pbs output file is directed

- *.csv

your generic data file. Can combine using terminal easily

e.g. `cat temp_* > final_temp`

- *.rds

Great for large, sparse objects. Can only save one object

Transferring files

- Client Based:

WinSCP (windows), Filezilla (windows, Mac, Linux)

- Command Line Based:

PuTTY, terminal

Copying data files to remote server

```
scp /path/to/local/file remote_user@remote_host:/path/to/remote/file
```

Copying data back to local computer

```
scp remote_user@remote_host:/path/to/remote/file /path/to/local/file
```

Example

```
robintu2@Robin-School-Desktop:~$ cd /mnt/e/methylation/data/
robintu2@Robin-School-Desktop:/mnt/e/methylation/data$ mkdir xinming_test
robintu2@Robin-School-Desktop:/mnt/e/methylation/data$ cd xinming_test/
robintu2@Robin-School-Desktop:/mnt/e/methylation/data/xinming_test$ touch file_{1..10}
robintu2@Robin-School-Desktop:/mnt/e/methylation/data/xinming_test$ ls -l
total 0
-rwxrwxrwx 1 robintu2 robintu2 0 Dec  6 17:40 file_1
-rwxrwxrwx 1 robintu2 robintu2 0 Dec  6 17:40 file_10
-rwxrwxrwx 1 robintu2 robintu2 0 Dec  6 17:40 file_2
-rwxrwxrwx 1 robintu2 robintu2 0 Dec  6 17:40 file_3
-rwxrwxrwx 1 robintu2 robintu2 0 Dec  6 17:40 file_4
-rwxrwxrwx 1 robintu2 robintu2 0 Dec  6 17:40 file_5
-rwxrwxrwx 1 robintu2 robintu2 0 Dec  6 17:40 file_6
-rwxrwxrwx 1 robintu2 robintu2 0 Dec  6 17:40 file_7
-rwxrwxrwx 1 robintu2 robintu2 0 Dec  6 17:40 file_8
-rwxrwxrwx 1 robintu2 robintu2 0 Dec  6 17:40 file_9
robintu2@Robin-School-Desktop:/mnt/e/methylation/data/xinming_test$ cd ..
```

Example

```
robintu2@Robin-School-Desktop:/mnt/e/methylation/data$ scp -r xinming_test/ robintu2@golub.campuscluster.illinois.edu:~/project-stat/xinming_test/
robintu2@golub.campuscluster.illinois.edu's password:
/home/robintu2/.bashrc: line 32: module: command not found
/home/robintu2/.bashrc: line 33: module: command not found
```

```
file_1 100% 0 0.0KB/s 00:00
file_10 100% 0 0.0KB/s 00:00
file_2 100% 0 0.0KB/s 00:00
file_3 100% 0 0.0KB/s 00:00
file_4 100% 0 0.0KB/s 00:00
file_5 100% 0 0.0KB/s 00:00
file_6 100% 0 0.0KB/s 00:00
file_7 100% 0 0.0KB/s 00:00
file_8 100% 0 0.0KB/s 00:00
file_9 100% 0 0.0KB/s 00:00
```

```
robintu2@golubh3(-bash): ~/project-stat > ls -al ~/project-stat/xinming_test/
total 2
drwxrwxrwx+ 2 robintu2 stat 4096 Dec 6 18:55 .
drwxr-s---+ 5 robintu2 stat 4096 Dec 6 18:55 ..
-rwxrwx---+ 1 robintu2 stat 0 Dec 6 18:55 file_1
-rwxrwx---+ 1 robintu2 stat 0 Dec 6 18:55 file_10
-rwxrwx---+ 1 robintu2 stat 0 Dec 6 18:55 file_2
-rwxrwx---+ 1 robintu2 stat 0 Dec 6 18:55 file_3
-rwxrwx---+ 1 robintu2 stat 0 Dec 6 18:55 file_4
-rwxrwx---+ 1 robintu2 stat 0 Dec 6 18:55 file_5
-rwxrwx---+ 1 robintu2 stat 0 Dec 6 18:55 file_6
-rwxrwx---+ 1 robintu2 stat 0 Dec 6 18:55 file_7
-rwxrwx---+ 1 robintu2 stat 0 Dec 6 18:55 file_8
-rwxrwx---+ 1 robintu2 stat 0 Dec 6 18:55 file_9
```

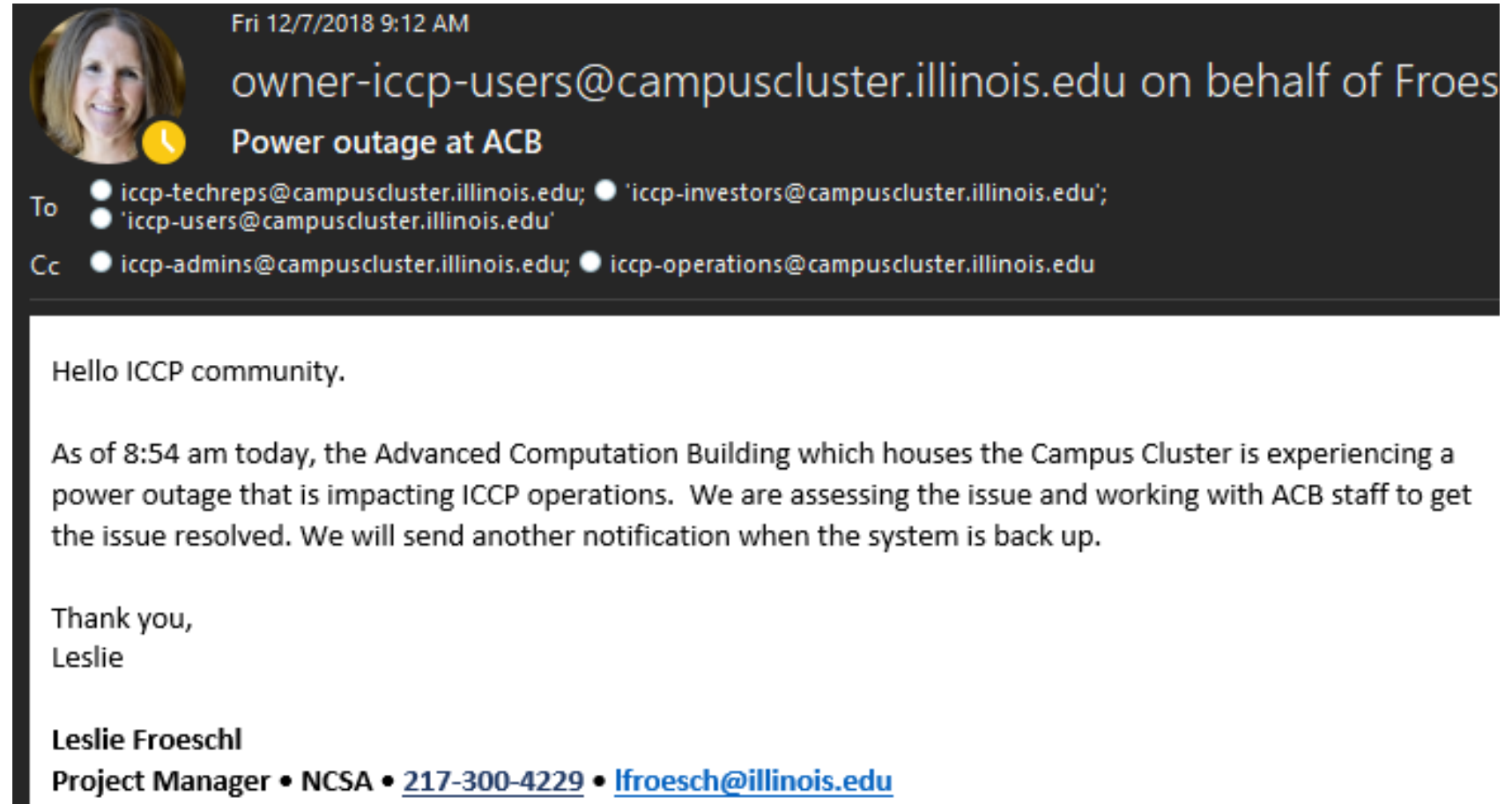
No results?

- Check the *.out file

```
robintu2@golubh4(-bash): ~/project-stat/PSS_ICC > cat cluster_demo_0.out
-----
Begin Torque Prologue (Thu Dec 6 23:44:53 2018)
Job ID: 7973827.cc-mgmt1.campuscluster.illinois.edu
Username: robintu2
Group: stat
Job Name: cluster_demo_0
Limits: walltime=04:00:00,nodes=1:ppn=2,neednodes=1:ppn=2
Job Queue: stat
Account: stat
Nodes: golub115
End Torque Prologue
-----
Error: object 'arg' not found
Execution halted
-----
Begin Torque Epilogue (Thu Dec 6 23:44:54 2018)
Job ID: 7973827.cc-mgmt1.campuscluster.illinois.edu
Username: robintu2
Group: stat
Job Name: cluster_demo_0
Session: 30246
Limits: walltime=04:00:00,nodes=1:ppn=2,neednodes=1:ppn=2
Resources: cput=00:00:00,vmem=152840kb,walltime=00:00:01,mem=39168kb,energy_used=0
Job Queue: stat
Account: stat
Nodes: golub115
End Torque Epilogue
-----
```

Can't log on?

- Maintenance?
- Check your email:



Final Remarks:

- Stat: ...for long computations
 1. Please **enable sharing**, sharing is off by default
 2. keep number of nodes used to less than 2 (<32-48 cores)
- Secondary: ...for jobs you can split up
 1. max walltime of 4 hours
 2. Cannot share cores
 3. Ram is divided proportional to the number of cores requested