

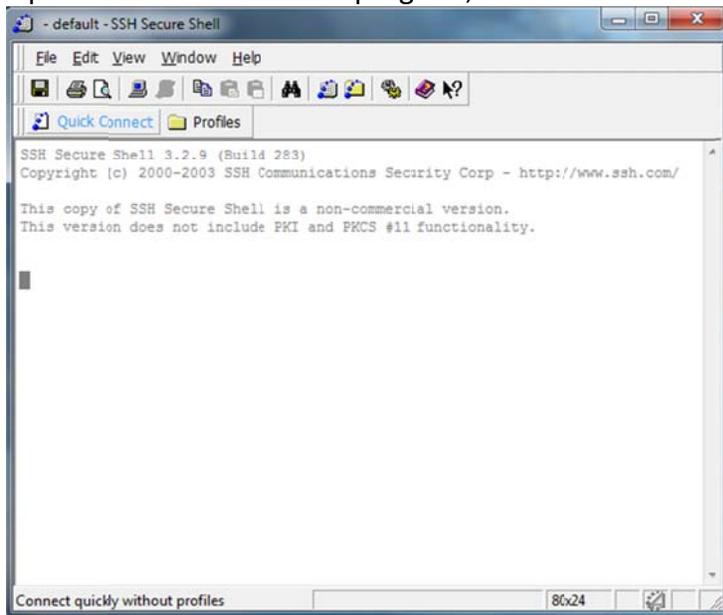
**How to Use the KU Advanced Computing Facility (ACF)  
to Run Software Remotely: Examples for SAS and STATA**  
*(handout created by Lesa Hoffman and Jonathan Templin; last updated 5/15/2015)*

**Preliminary Steps and Resources:**

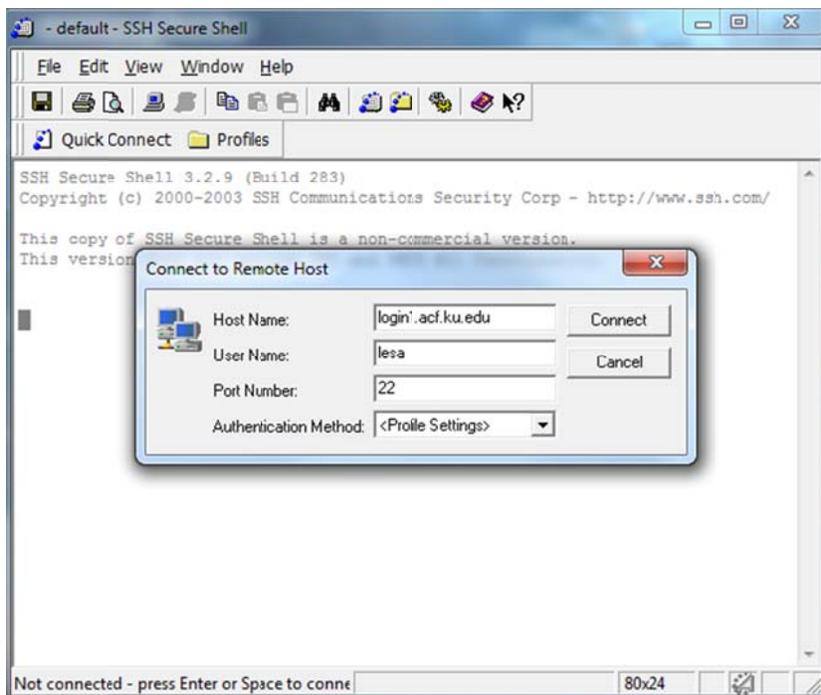
1. Email [clusterhelp@acf.ku.edu](mailto:clusterhelp@acf.ku.edu) and request a cluster account. They will send you instructions on how to sign up for an account. If you are signing up to use an account for an established group, you will need to the signature of the Principal Investigator to create an account.
2. Install the SSH client. If you are running a Windows operating system, download and install the SSH client from my website: <http://jonathantemplin.com/SSHSecureShellClient-3.2.9.exe>. If you are running Mac or Linux, SSH should already be included.
3. Bookmark the ACF Wiki page: <http://www.acf.ku.edu/wiki>. This is about the only page that the ACF has for information on how to run tasks.
4. Here is another page of ACF resources compiled by Jonathan Templin:  
<http://jonathantemplin.com/advanced-computing-facility-supercomputer-information/>
5. Download the example files for SAS and STATA referred to in this example and save them for use as you follow along.  
  
SAS: <http://www.lesahoffman.com/SPLH861/SASstest.zip>  
STATA: <http://www.lesahoffman.com/SPLH861/STATAtest.zip>
6. If you are connecting from off-campus, first connect to the KU VPN KUAnywhere.ku.edu. Visit this page for instructions to download the software if you haven't used it before:  
<http://technology.ku.edu/kuanywhere>.

Follow these steps to initially connect to the KU ACF. After you have done so for the first time, you can skip to step #5 below to enter your password.

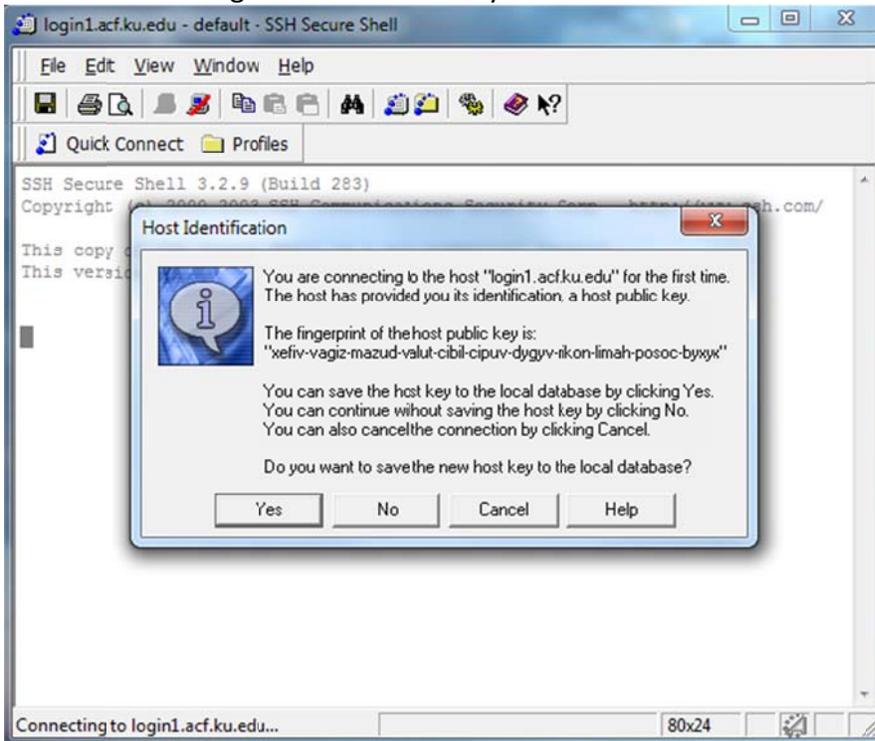
1. Open the SSH Secure Shell program, and select the icon for “Quick Connect”:



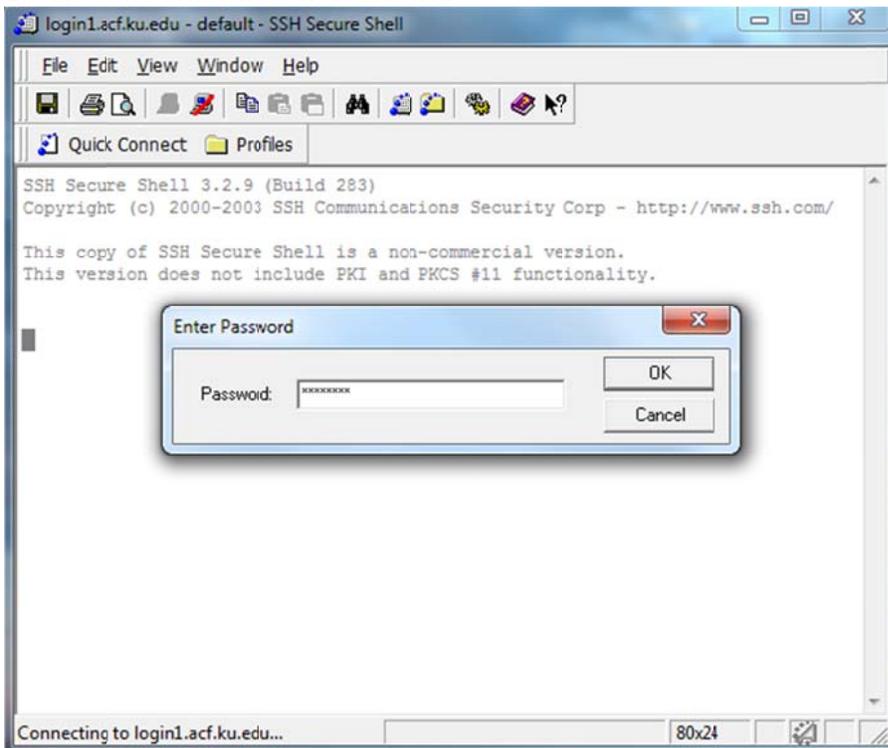
2. A prompt will appear called “Connect to Remote Host”. Enter the following as shown below:
  - a. Host Name = login1.acf.ku.edu
  - b. User Name = your account name
  - c. Port Number = 22 (default value)



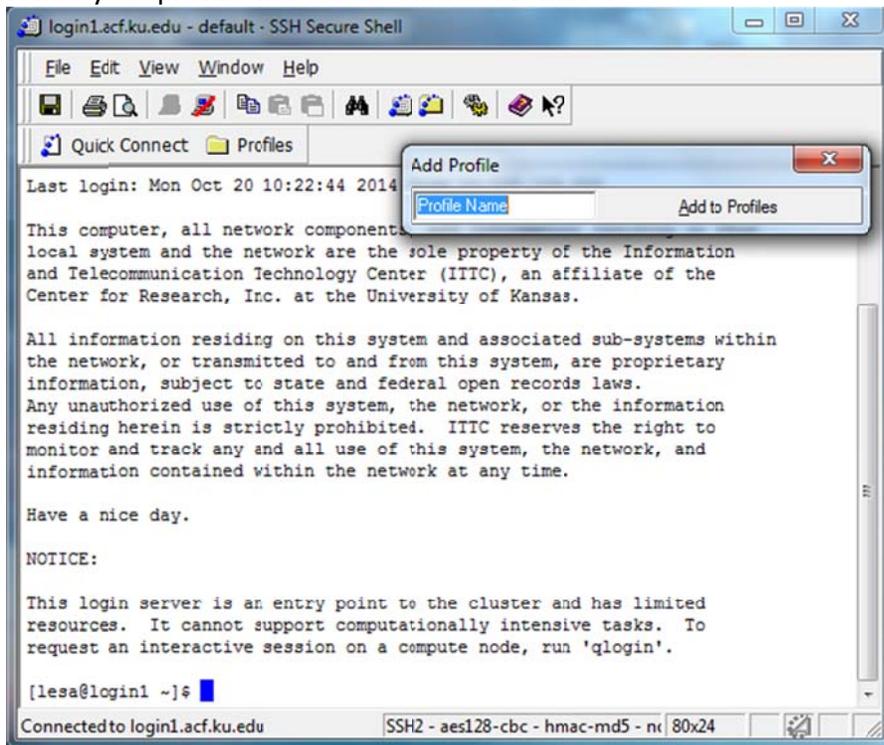
3. Upon selecting "Connect" the following prompt will appear that asks you if you want to save your connection settings via a new host key to local database. Select "Yes".



4. You will be prompted for the password you selected when you initially created your account. Enter it into the window as shown:

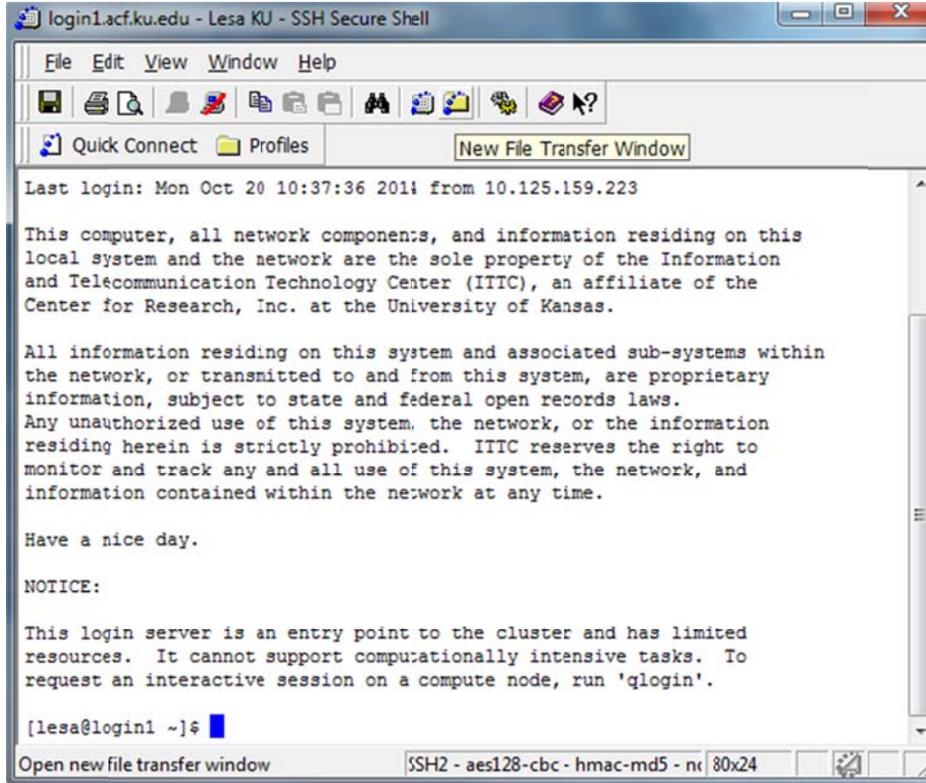


5. Upon successfully connecting, you will be prompted to save your connection as a new profile. Name your profile and select “Add to Profiles”:

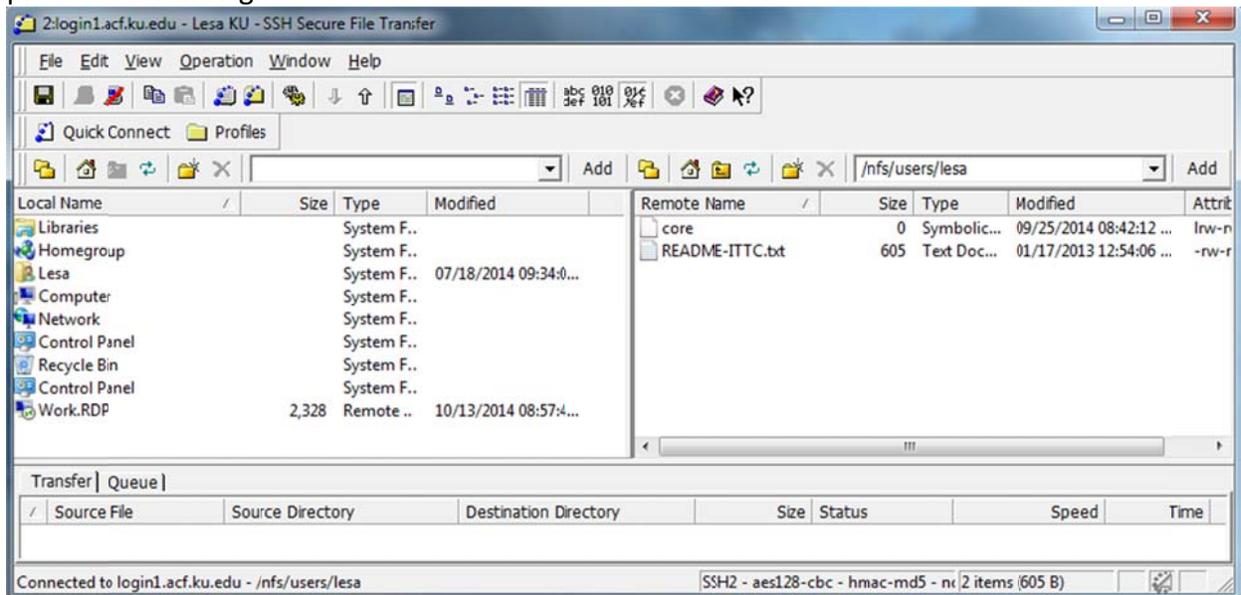


In future log-ins, you can click on “profiles” to bring up the profile you just named that has your saved log-in info (and just enter your password).

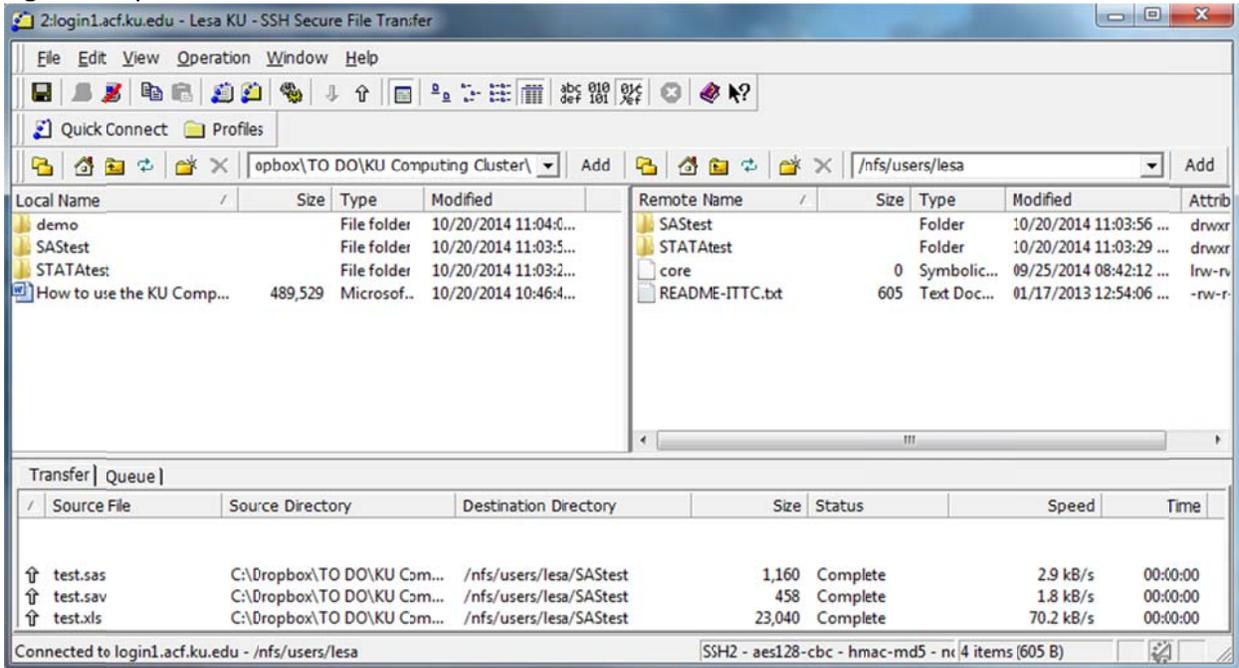
6. In the toolbar, select the yellow folder with blue dots to open a “New File Transfer Window”:



7. It will open a program called “SSH Secure File Transfer” that looks similar to Windows Explorer, in which your local files are listed on the left, and the remote directory you have logged into is provided on the right:



8. In the left-side panel, click on the icons to navigate to the location where the “SAStest” and “STATAtest” folders that you downloaded earlier are stored. Drag these two folders over to the right-side panel. The files transferred will be listed in the bottom window:



9. Return to the SSH Secure Shell window. For a full list of the software available to you, type “module avail” at the command prompt and hit enter:

```

1:login1.acf.ku.edu - Lesa KU - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles
Last login: Mon Oct 20 10:37:36 2014 from 10.125.159.223

This computer, all network components, and information residing on this
local system and the network are the sole property of the Information
and Telecommunication Technology Center (IITC), an affiliate of the
Center for Research, Inc. at the University of Kansas.

All information residing on this system and associated sub-systems within
the network, or transmitted to and from this system, are proprietary
information, subject to state and federal open records laws.
Any unauthorized use of this system, the network, or the information
residing herein is strictly prohibited. IITC reserves the right to
monitor and track any and all use of this system, the network, and
information contained within the network at any time.

Have a nice day.

NOTICE:

This login server is an entry point to the cluster and has limited
resources. It cannot support computationally intensive tasks. To
request an interactive session on a compute node, run 'qlogin'.

[lesa@login1 ~]$ module avail

```

10. You will see an extensive two-column list, followed by a return to the command prompt:

```

1:login1.acf.ku.edu - Lesa KU - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles
gcc/4.6.0          scipy/0.12.0
gcc/4.6.1          scon
gcc/4.6.2          scythe
gcc/4.6.3          sickle
gcc/4.7.0          soap/1.05
gcc/4.7.1          soap2/r240
gcc/4.7.3          sratoolkit/2.2.2a
geneid/1.4.4       stacks/0.99999
genewise/2.2.3     stacks/1.03
genewise/2.4.1     stampy/1.0.22
gmsh/2.8.4         star/2.3.0
grace/5.1.23       stata/13
hmmer/3.0          structure/2.3.4
hmmer/3.1b1        swig/2.0.8
hod/1.0.4          tophat/2.0.10
hsi/4.0            tophat/2.0.11
htseq/0.6.1p1     tophat/2.0.6
imsl/7.0.1         tophat/2.0.9
intel_compiler     towhee/7.0.4
intel_mpi_intel64/4.1.0.024 tpp/4.7.1
interproscan/5     ucsc/tools
jdk/1.5.0_22       velvet/1.2.09
jdk/1.6.0_30       vmd/1.9.1
[lesa@login1 ~]$

```

Refer to this list for the names of the programs you will be loading and running later.

## 11. Now let's run SAS!

**First, tell SSH Secure Shell where your SAS files are stored:** Within the SSH Secure Shell window, to change the folder location within your main directory, type “cd” and then the case-sensitive name of the folder you want to navigate to.

For instance, to get to the “SASstest” folder, type “cd SASstest” and then hit enter. You will see that the location within brackets has now changed to the specified folder:

The screenshot shows an SSH Secure Shell window titled "login1.acf.ku.edu - Lesa KU - SSH Secure Shell". The window contains a list of installed software packages, including gcc/4.6.1 through gcc/4.7.3, geneid/1.4.4, genewise/2.2.3, gms/2.8.4, grace/5.1.23, hmmer/3.0, hsi/4.0, htseq/0.6.1p1, imsl/7.0.1, intel\_compiler, intel\_mpi\_intel64/4.1.0.024, interproscan/5, jdk/1.5.0\_22, jdk/1.6.0\_30, scons, scythe, sickle, soap/1.05, soap2/r240, sratoolkit/2.2.2a, stacks/0.99999, stacks/1.03, stampy/1.0.22, star/2.3.0, stats/13, structure/2.3.4, swig/2.0.8, tophat/2.0.10, tophat/2.0.11, tophat/2.0.6, tophat/2.0.9, towhee/7.0.4, tpp/4.7.1, ucsc/tools, velvet/1.2.09, and vmd/1.9.1. The terminal prompt shows the user [lesa@login1 ~] executing the command "cd SASstest" and the prompt changing to [lesa@login1 SASstest].

Note that within the “test.sas” example syntax file, your file location (as abbreviated by “folder” below) should be changed to your own directory instead:

```

5
6 * Create macro variable for folder location and SAS library;
7 * CHANGE THIS TO YOUR DIRECTORY;
8 %LET folder=/nfs/users/lesa/SASstest;
9 LIBNAME folder "&folder.";

```

12. **Second, load SAS:** type “module load SAS/9.4”(which is case-sensitive!) and hit enter:

```

1:login1.acf.ku.edu - Lesa KU - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles
gcc/4.6.2          scythe
gcc/4.6.3          sickle
gcc/4.7.0          soap/1.05
gcc/4.7.1          soap2/r240
gcc/4.7.3          sratoolkit/2.2.2a
geneid/1.4.4       stacks/0.99999
genewise/2.2.3     stacks/1.03
genewise/2.4.1     stampy/1.0.22
gmsh/2.8.4         star/2.3.0
grace/5.1.23       stata/13
hmmer/3.0          structure/2.3.4
hmmer/3.1b1        swig/2.0.8
hod/1.0.4          tophat/2.0.10
hsi/4.0            tophat/2.0.11
htseq/0.6.1p1     tophat/2.0.6
ims1/7.0.1         tophat/2.0.9
intel_compiler     towhee/7.0.4
intel_mpi_intel64/4.1.0.024 tpp/4.7.1
interproscan/5     ucsc/tools
jdk/1.5.0_22       velvet/1.2.09
jdk/1.6.0_30       vmd/1.9.1
[lesa@login1 ~]# cd SASStest
[lesa@login1 SASStest]# module load SAS/9.4
[lesa@login1 SASStest]#
Connected to login1.acf.ku.edu      SSH2 - aes128-cbc - hmac-md5 - nt 80x24

```

13. **Third, run a .sas syntax file within your current folder:** type “sas” and then the case-sensitive name of that syntax file. For example, to run the test.sas syntax file within our current “SASStest” folder location, type “sas test.sas” and hit enter, as shown below:

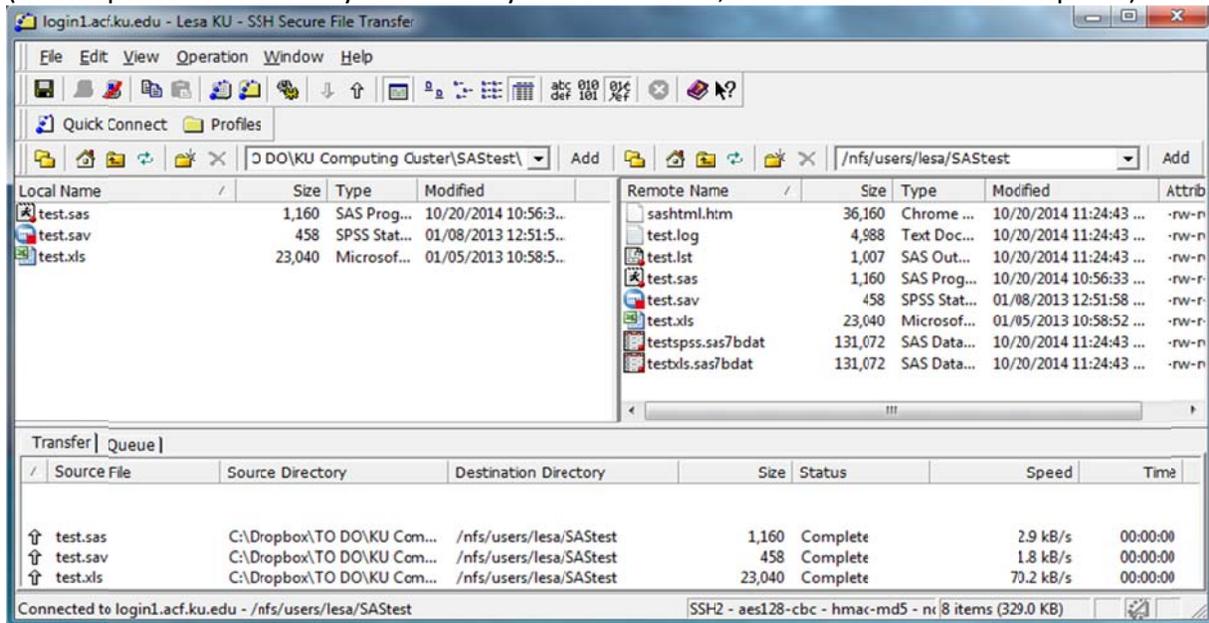
```

1:login1.acf.ku.edu - Lesa KU - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles
gcc/4.6.3          sickle
gcc/4.7.0          soap/1.05
gcc/4.7.1          soap2/r240
gcc/4.7.3          sratoolkit/2.2.2a
geneid/1.4.4       stacks/0.99999
genewise/2.2.3     stacks/1.03
genewise/2.4.1     stampy/1.0.22
gmsh/2.8.4         star/2.3.0
grace/5.1.23       stata/13
hmmer/3.0          structure/2.3.4
hmmer/3.1b1        swig/2.0.8
hod/1.0.4          tophat/2.0.10
hsi/4.0            tophat/2.0.11
htseq/0.6.1p1     tophat/2.0.6
ims1/7.0.1         tophat/2.0.9
intel_compiler     towhee/7.0.4
intel_mpi_intel64/4.1.0.024 tpp/4.7.1
interproscan/5     ucsc/tools
jdk/1.5.0_22       velvet/1.2.09
jdk/1.6.0_30       vmd/1.9.1
[lesa@login1 ~]# cd SASStest
[lesa@login1 SASStest]# module load SAS/9.4
[lesa@login1 SASStest]# sas test.sas
[lesa@login1 SASStest]#
Connected to login1.acf.ku.edu      SSH2 - aes128-cbc - hmac-md5 - nt 80x24

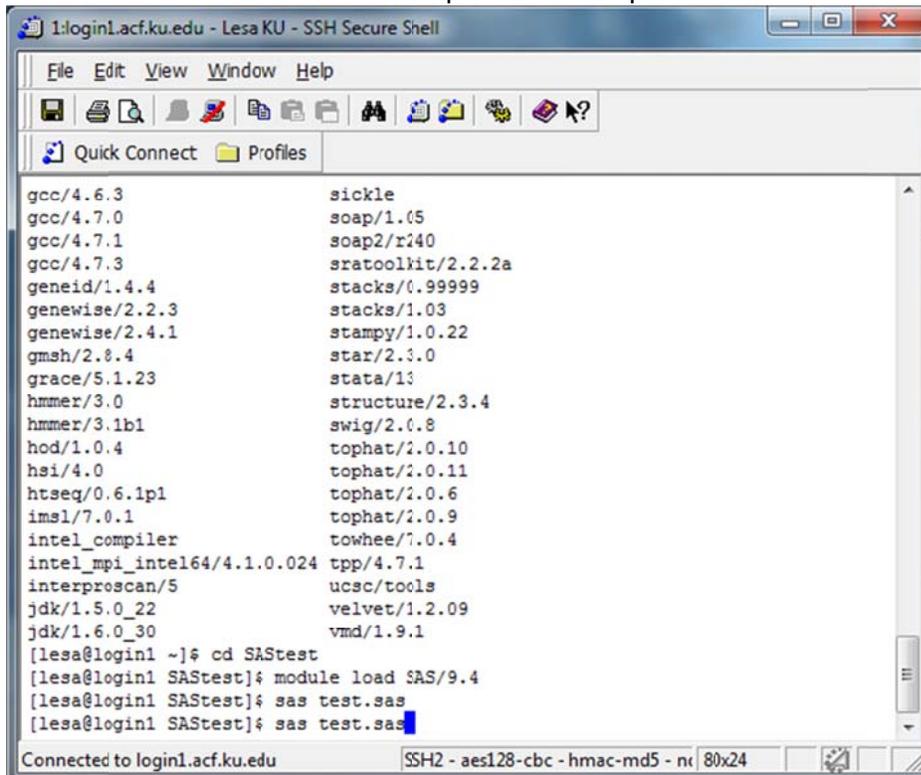
```

It will look like nothing happened, and then the prompt will return. This is actually good—it means your syntax file ran.

14. **Fourth, see the results in the SSH Secure File Transfer window:** in the right-side panel, double-click on the “SASstest” folder and you will see the new files that resulted from the run (as compared to the locally saved files you started with, as shown in the left-side panel):

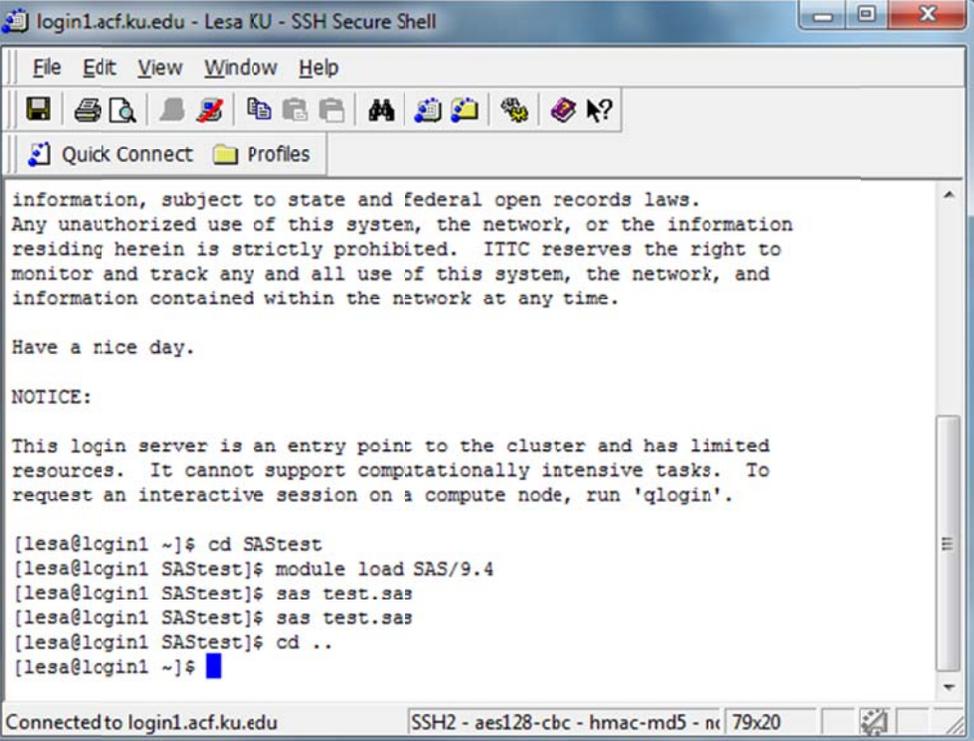


15. To retrieve the new files, select and drag them back to the left-side panel. You can now work with them on your local directory as needed. Repeat this process each time you run a syntax file.
16. To re-run the same files, you don't have to type the commands again. Instead, return to the SSH Secure Shell window and hit the up arrow. Your previous command will re-appear as shown:



## 17. Now let's run STATA!

**First, tell SSH Secure Shell where your STATA files are stored:** Previously you changed the folder location from your main directory by typing “cd” and then the name of the folder you wanted to navigate to. Now, you need to go back up to the main directory: type “cd ..” and hit enter:



```

login1.acf.ku.edu - Lesa KU - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles

information, subject to state and federal open records laws.
Any unauthorized use of this system, the network, or the information
residing herein is strictly prohibited. ITTC reserves the right to
monitor and track any and all use of this system, the network, and
information contained within the network at any time.

Have a nice day.

NOTICE:

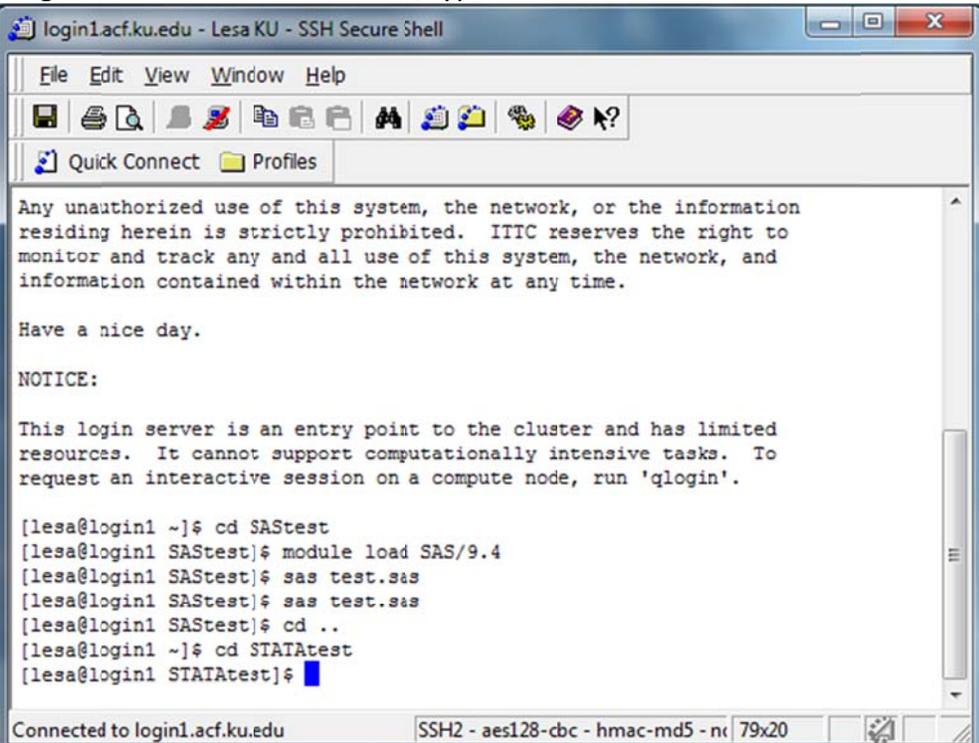
This login server is an entry point to the cluster and has limited
resources. It cannot support computationally intensive tasks. To
request an interactive session on a compute node, run 'qlogin'.

[lesa@login1 ~]$ cd SASstest
[lesa@login1 SASstest]$ module load SAS/9.4
[lesa@login1 SASstest]$ sas test.sas
[lesa@login1 SASstest]$ sas test.sas
[lesa@login1 SASstest]$ cd ..
[lesa@login1 ~]$

```

Connected to login1.acf.ku.edu      SSH2 - aes128-cbc - hmac-md5 - nc 79x20

You will see that the location within brackets has now changed to the main directory folder. To get to the “STATAtest” folder, type “cd STATAtest” and then hit enter:



```

login1.acf.ku.edu - Lesa KU - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles

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residing herein is strictly prohibited. ITTC reserves the right to
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NOTICE:

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resources. It cannot support computationally intensive tasks. To
request an interactive session on a compute node, run 'qlogin'.

[lesa@login1 ~]$ cd SASstest
[lesa@login1 SASstest]$ module load SAS/9.4
[lesa@login1 SASstest]$ sas test.sas
[lesa@login1 SASstest]$ sas test.sas
[lesa@login1 SASstest]$ cd ..
[lesa@login1 ~]$ cd STATAtest
[lesa@login1 STATAtest]$

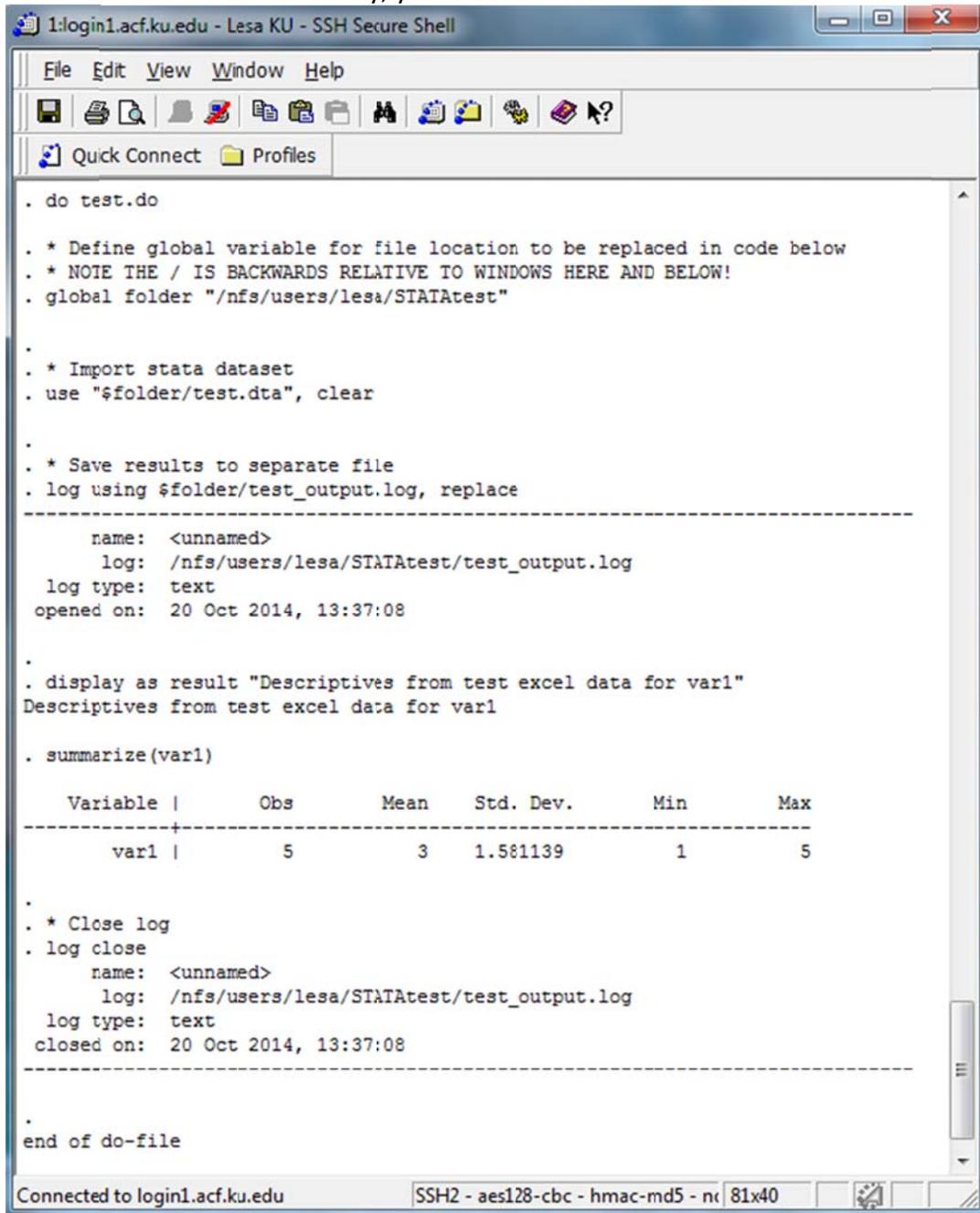
```

Connected to login1.acf.ku.edu      SSH2 - aes128-cbc - hmac-md5 - nc 79x20



20. **Third, run a .do syntax file within your current folder:** type “do” and then the case-sensitive name of that syntax file. For example, to run the test.do syntax file within our current “STATAtest” folder location, type “do test.do” and hit enter, as shown below:

If the .do file did not finish correctly, you will see an error message telling you what went wrong. If the .do file did finish correctly, you should see its contents echoed in the SSH window as shown:



```

. do test.do

. * Define global variable for file location to be replaced in code below
. * NOTE THE / IS BACKWARDS RELATIVE TO WINDOWS HERE AND BELOW!
. global folder "/nfs/users/lesa/STATAtest"

.

. * Import stata dataset
. use "$folder/test.dta", clear

.

. * Save results to separate file
. log using $folder/test_output.log, replace
-----
      name: <unnamed>
      log:  /nfs/users/lesa/STATAtest/test_output.log
      log type: text
      opened on: 20 Oct 2014, 13:37:08

.

. display as result "Descriptives from test excel data for var1"
Descriptives from test excel data for var1

. summarize(var1)

      Variable |      Obs      Mean   Std. Dev.   Min      Max
-----+-----
      var1 |         5         3   1.581139         1         5

.

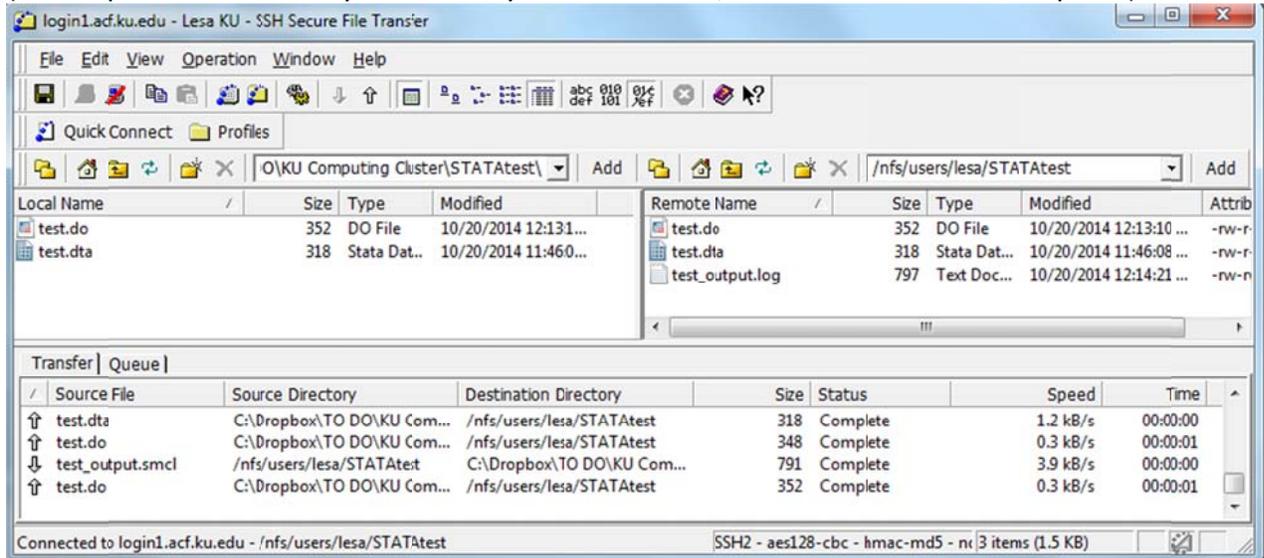
. * Close log
. log close
      name: <unnamed>
      log:  /nfs/users/lesa/STATAtest/test_output.log
      log type: text
      closed on: 20 Oct 2014, 13:37:08
-----

.
end of do-file

```

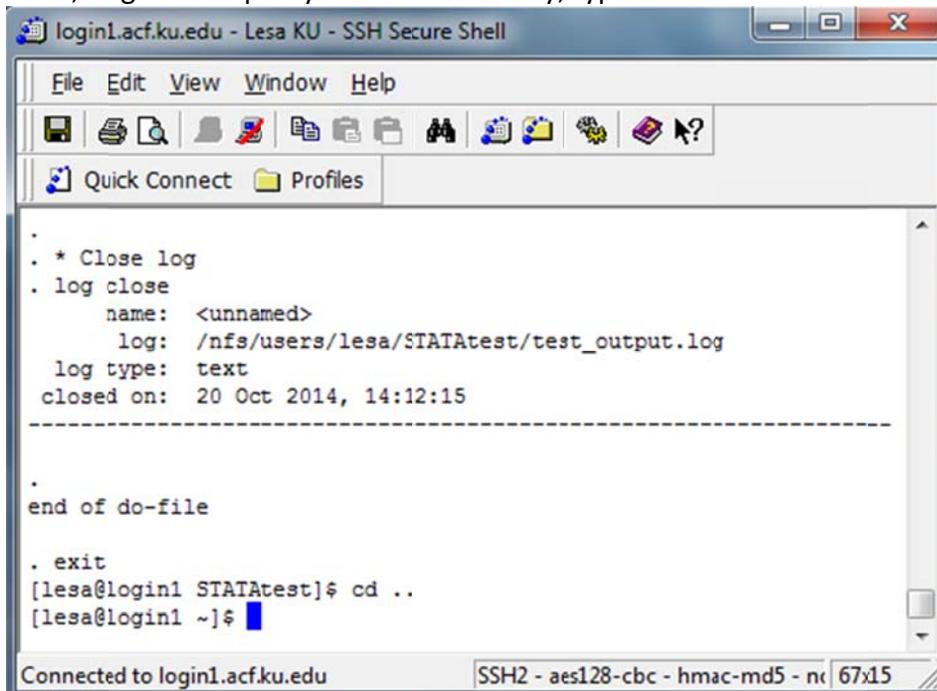
Connected to login1.acf.ku.edu      SSH2 - aes128-cbc - hmac-md5 - n 81x40

21. **Fourth, see the results in the SSH Secure File Transfer window:** in the right-side panel, double-click on the “STATAtest” folder and you will see the new files that resulted from the run (as compared to the locally saved files you started with, as shown in the left-side panel):



22. To retrieve the new files, select and drag them back to the left-side panel. You can now work with them on your local directory as needed. Repeat this process each time you run a syntax file.

23. **Fifth, exit STATA and return to the general command prompt:** type “exit” and hit enter. Then, to go back up to your main directory, type “cd ..” and hit enter.



### Other software:

To run other software, follow the same process. For instance, **to run R**:

- a. First, tell SSH Secure Shell where your files are stored by typing “`cd foldername`” from your main directory.
- b. Second, load the program.  
For R, type “`module load R/3.1.0`” and hit enter. Then type “`R`” and hit enter.
- c. Third, run the syntax file.  
For R, type “`Rscript syntaxfilename.R`” and hit enter.
- d. Fourth, see the results in the SSH Secure File Transfer window.
- e. Fifth, to exit R, type “`q()`” and hit enter.

### Submitting jobs:

If your program will take a while to run, you can submit it as a “job” instead of inter-actively. To do so, you will need a .txt file in the following format.

Below on the left is “example\_stata\_job.txt” within the “STATAtest” folder, with notes below:

```

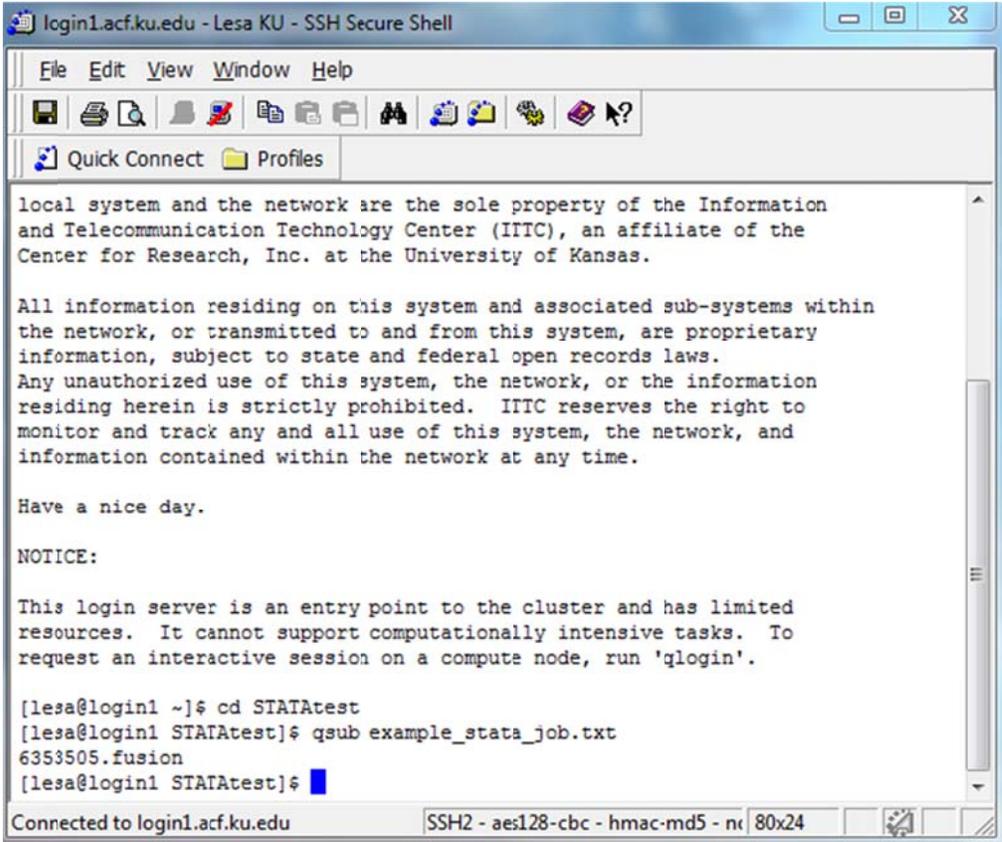
1 #PBS -N example_stata_batch_job
2 #PBS -q default
3 #PBS -l nodes=1:ppn=8,walltime=00:01:00,mem=24gb
4 #PBS -M email@ku.edu
5 #PBS -m abe
6 #PBS -e /nfs/users/lesa/STATAtest/testerrors.log
7 #PBS -o /nfs/users/lesa/STATAtest/testoutput.log
8
9 module load stata/13
stata -b do /nfs/users/lesa/STATAtest/test.do

```

1. Name of job
2. Queue to submit to (default, long, bigm, interactive)
3. # of nodes to use, # processors per node (up to 20), time (hour:minute:second), memory (up to 256 gb in default queue)
4. Email address to notify about job progress
5. Email when: a = job is found, b = job begins, e = job ends
6. File to send errors to
7. File to send output to
8. Load program
9. Run syntax file (search for the exact phrase to type, which differs by program)

### Steps to submitting a job:

1. Load the job text file and all necessary files into the remote directory.
2. Within the SSH Secure Shell Window, navigate to the remote directory by typing “cd” followed by the folder name. For example, to go to our example “STATAtest” folder, type “cd STATAtest” and hit enter as shown below.
3. Type “qsub” followed by the file name and hit enter. For example, to submit our example STATA job, type “qsub example\_stata\_job.txt” and hit enter. It will then show an ID number for your job:

A screenshot of an SSH Secure Shell window titled "login1.acf.ku.edu - Lesa KU - SSH Secure Shell". The window has a menu bar (File, Edit, View, Window, Help) and a toolbar with various icons. Below the toolbar, there are tabs for "Quick Connect" and "Profiles". The main terminal area displays the following text:

```
local system and the network are the sole property of the Information
and Telecommunication Technology Center (IITC), an affiliate of the
Center for Research, Inc. at the University of Kansas.

All information residing on this system and associated sub-systems within
the network, or transmitted to and from this system, are proprietary
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Have a nice day.

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resources. It cannot support computationally intensive tasks. To
request an interactive session on a compute node, run 'qlogin'.

[lesa@login1 ~]$ cd STATAtest
[lesa@login1 STATAtest]$ qsub example_stata_job.txt
6353505.fusion
[lesa@login1 STATAtest]$
```

The status bar at the bottom of the window shows "Connected to login1.acf.ku.edu" and "SSH2 - aes128-cbc - hmac-md5 - nc 80x24".

4. To check on the status of your job, type “qstat” followed by the ID number, and hit enter. To check on this example, type “qstat 6353505.fusion” and hit enter. It should also email you with status updates as specified in the .txt file.