

Advice for using the lab computers*

Professor Koenker supplies the computer *ragnar* (as in Ragnar Frisch) for use in the Econometrics Lab. Its operating system is a version of Linux, Red Hat Enterprise 5.7, which can make it somewhat less accessible than your laptop. This document will get you up and running on how to use programs such as R, Stata, SAS, Mathematica, and MATLAB through the terminals (i.e., the screens in the lab) or remotely with your own computer.

You should already have an account on *ragnar*. Your user name is usually your University of Illinois NetID. If you are not sure, email me at ahagem2@illinois.edu.

1 Using the Terminals

Log in at one of the terminals with your user name and password. Select the program Terminal from the “Applications”/“Accessories” menu. You will see a command prompt, which looks something like this:

```
[<netid>@ragnar ~]$
```

The tilde means that you are in your personal directory on *ragnar*, i.e., `/home/<netid>/`, where `<netid>` is your user name. This prompt accepts standard Unix/Linux commands. You can now start programs by typing in `R`, `stata`, `xstata`, `sas`, `mathematica`, or `matlab`. Here `stata` loads Stata in command line mode and `xstata` starts the graphical user interface (GUI) instead.

A useful way to handle large computing jobs is the ampersand (`&`) symbol. For example, if a program takes several hours, days, or weeks to compute in R, use

```
R CMD BATCH script.R &
```

to run the program `script.R` while keeping the command prompt available. You can then log out of the terminal without terminating your program. This is particularly handy when combined with an SSH program such as `puTTY` below: Simply submit a job to *ragnar* as in the example and then close the remote connection. Your task will not be affected. Without the ampersand, the server will quit your session.

2 Connecting remotely for Windows users

Users of Windows (no particular version is required) can connect to *ragnar* by establishing a secure (SSH) connection via the following programs. You can then remotely access programs such as R or Stata and transfer files between *ragnar* and your computer.

*This version: September 10, 2011. This note was written mostly by Tom Parker with some later modifications and additions by Andreas Hagemann. Comments are, of course, always welcome. Please send them to ahagem2@illinois.edu.

puTTY This program connects your computer via the SSH network protocol to access a terminal just like you would on one of the lab computers. You can find puTTY easily through Google. It is available for free download at

<http://www.chiark.greenend.org.uk/~sgtatham/putty/>

After installing it, you should use the SSH part of the preferences menu to tell it to connect to

`ragnar.econ.illinois.edu`

with the user name and password you were already given. If you log in successfully, you will see a command prompt that behaves just like the **Terminal** described in the previous section. The command `exit` logs you out.

WinSCP This easy-to-use program allows you to transfer files between your computer and *ragnar*. Go to

<http://winscp.net>

to download it for free. It has a setup panel similar to that of puTTY. Select “SFTP” and, as before, you should connect to `ragnar.econ.illinois.edu` using your user name and password. When you connect you see two panels, each of which portrays the contents of directories on your own computer and on *ragnar*. You can transfer files from one computer to the other by dragging and dropping.

Cyberduck This free file manager is similar to WinSCP, but is also optimized to work with popular “cloud” services such as Google Docs and Amazon S3. See

<http://cyberduck.ch>

for a download link. Just like WinSCP, Cyberduck is very easy to use. Press the “Open Connection” button and select “SFTP (SSH File Transfer Protocol)” to connect to `ragnar.econ.illinois.edu` with your user name and password. Your connection details are then saved in the “History” tab for future use. Cyberduck also supports drag-and-drop.

Xming (*This paragraph was written by the former lab administrator, I have actually no experience with this under Windows.*) The windowing system used on *ragnar* is called X11 (and then the windows are called X windows,) which uses different code than Microsoft’s windowing system, and therefore the X11-window signals that *ragnar* might send to your computer cannot be interpreted by your computer’s Microsoft-windows software. If you log into *ragnar* from your computer you will only be able to see the terminal window, and if you try and run, for example, the GUI version of **Stata**, nothing will happen. That is because the shell in puTTY needs X windows to display its output. If you really want to use GUI versions of your favorite programs, you also need an X window system. The one I have most experience with is called Xming:

<http://www.straightrunning.com/XmingNotes/>

You will need to turn the X Windows on and set them to receive their signal from `puTTY` in the preferences, and you may need to change a setting in `puTTY` too (I believe it may be that you have to allow tunnelling, which is buried in one of the SSH directories of the preferences panels.) Then when you log in using `puTTY`, and type, for example, `xstata`, you should see the GUI version of Stata in an X window. Note that the best way to use *ragnar* is, however, to run batch versions of the programs (i.e., where you collect the output in a file and look at it afterwards).

3 Connecting remotely for Apple and Linux users

You can connect to *ragnar* via SSH. This allows you to remotely access programs such as R or Stata and to transfer files between *ragnar* and your computer.

Terminal If you use an Apple computer or a computer with a Linux OS, connecting to *ragnar* is very easy. All you need is a Terminal program, which Mac OS X and Linux have by default. On Mac OS X, you can find one in the “Utilities” portion of the “Applications” or just type in `terminal` in the Spotlight search bar. From the Terminal, you can use `ssh` and `scp` to connect and transfer files. The same commands also work in Linux. For example, if `<netid>` is your user name on *ragnar*, type

```
ssh <netid>@ragnar.econ.illinois.edu
```

to connect via SSH. If your user name on your computer and on *ragnar* coincide, you can leave out `<netid>` in the preceding display. If you want to see X windows, use `ssh -Y` instead of `ssh`.

If you work frequently with *ragnar*, entering your password at each login can be avoided with the help of an RSA key. The idea is to generate two key files, a private key for your computer and a public key for *ragnar*; these files are then compared automatically when you use SSH. In the Mac OS X Terminal, type

```
ssh-keygen
```

You will be asked to provide a location to generate your RSA keys. The default is

```
/Users/<username>/.ssh/id_rsa
```

where `<username>` is your user name on your computer. Next, you will be prompted to enter a pass phrase; this is neither your password for your computer, nor your password for *ragnar*, but a third password generated by you. It should have 10 to 30 characters. Mac OS X will then generate your RSA key. In particular, your public key will be in the file

```
/Users/<username>/.ssh/id_rsa.pub
```

Now SSH into *ragnar* and make a directory called `.ssh` in your home directory with

```
mkdir .ssh
```

Copy your public key file into this folder and rename it to `authorized_keys` on *ragnar*. To copy and rename in one step, simply log out of *ragnar* and enter

```
scp /Users/<username>/.ssh/id_rsa.pub  
    <netid>@ragnar.econ.illinois.edu:./ssh/authorized_keys
```

in the `Terminal` of your Mac, where the displayed command is meant as a single line separated by a space. Log into *ragnar* again and change the file permission of the public key to “read/write by owner only” with the command

```
chmod 600 /home/<netid>/.ssh/authorized_keys
```

The first time you SSH into *ragnar* after these changes, you will be asked for the pass phrase for your RSA key. All subsequent logins will be automatic. The same steps also work with Linux, but the directory paths on your computer will most likely differ.

Cyberduck This is an excellent Mac OS X file manager that lets you easily transfer files between your computer and *ragnar* or other servers. The previous section contains a short description.