

Workshop: High-performance computing for economists

Lars Vilhuber¹ John M. Abowd¹ Richard Mansfield¹
Kevin L. McKinney

¹Cornell University, Economics Department,

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Discussion of HPC

XSEDE presentation by Phil Blood, PSC (2012)

ECCO

<http://www.vrdc.cornell.edu/ecco/>

Clusters

What are clusters?

- ▶ <http://www.rocksclusters.org/>
- ▶ Torque Job Submission
- ▶ STAR Cluster
- ▶ Oracle (Sun) Grid Engine

Where are clusters?

- ▶ CAC Private Clusters [Rocks]
- ▶ XSEDE

Where can I get computers?

- ▶ Buy them (Dell, etc.)
- ▶ Buy a subscription: CAC RedCloud [Eucalyptus]
- ▶ Rent them: Amazon EC2 (STAR cluster)
- ▶ Steal them: Botnet with 450,000 computers
- ▶ Use free ones: CPU scavenging (HTCondorG, SETI@Home)

Getting access

...legally

- ▶ Apply for an account on ECCO
- ▶ Accounts on CAC general cluster no longer available
- ▶ Buy resources at Amazon
 - ▶ 750 hrs/month free for the first year if using Micro instances
 - ▶ 0.615GB , Very Low network performance
- ▶ Apply for an XSEDE account

Linux

- ▶ used on most compute clusters
- ▶ used on very few desktop computers
- ▶ but...

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Bash

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- ▶ bash or ksh (Korn shell) or csh (C-shell) are the most common
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Bash

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- ▶ bash is available on Linux and OSX
- ▶ you can also download Cygwin, getting bash for Windows

Access to your local compute cluster

Several on-campus compute resources

- ▶ Cornell Center for Advanced Computing (CAC)

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- ▶ Cornell Center for Advanced Computing (CAC)
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- ▶ Cornell Institute for Social and Economic Research (CISER) → Thursday
- ▶ Economics Compute Cluster Organization (ECCO), aka Social Science Gateway (SSG)

Getting access to ECCO

You already have...

- ▶ You have an account by virtue of participating in this class
- ▶ Moving forward, you will be eligible to faculty-sponsored accounts
- ▶ Currently soft-monitoring of resource usage

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Have you logged in via SSH to reset your password?

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... but do you have **access**?

Have you logged in via SSH to reset your password?

→ **Instructions**

Quick walkthrough, using Chrome SSH

Secure Shell 0.8.22

Welcome to Secure Shell version 0.8.22.
Answers to Frequently Asked Questions: <http://goo.gl/m6Nj8>

[New Connection] **lv39@ssg.vrdc.cornell.edu**
spec492@ssg.vrdc.cornell.edu

lv39@ssg.vrdc.cornell.edu

lv39 ssg.vrdc.cornell.edu port
relay hostname port

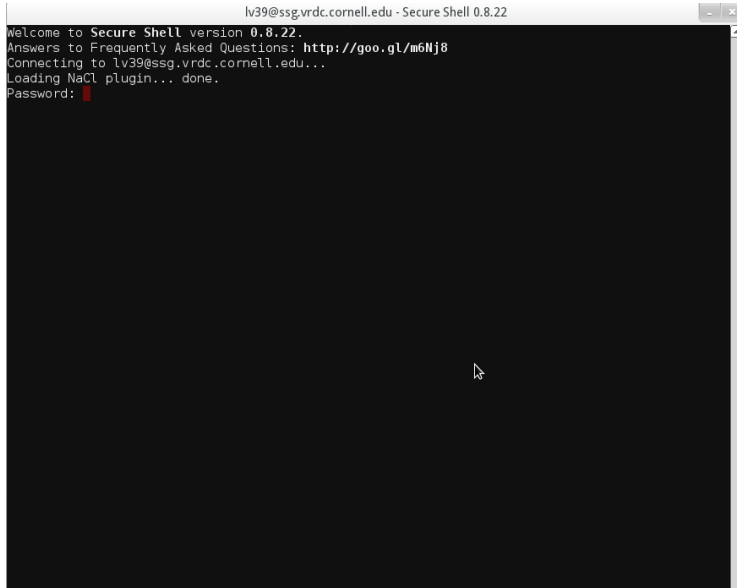
Identity: [default] Import...

SSH Arguments: extra command line arguments

Terminal Profile: default

[DEL] Delete [ENTER] Connect

Quick walkthrough, using Chrome SSH

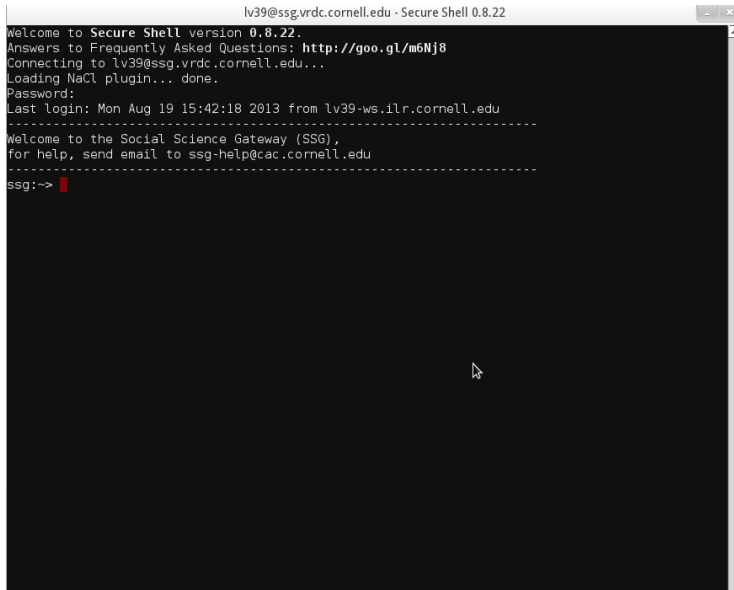


The screenshot shows a terminal window titled "lv39@ssg.vrdc.cornell.edu - Secure Shell 0.8.22". The terminal output is as follows:

```
Welcome to Secure Shell version 0.8.22.  
Answers to Frequently Asked Questions: http://goo.gl/m6Nj8  
Connecting to lv39@ssg.vrdc.cornell.edu...  
Loading NaCl plugin... done.  
Password: 
```

The terminal background is black, and the text is white. A mouse cursor is visible in the center of the terminal area.

Quick walkthrough, using Chrome SSH



```
lv39@ssg.vrdc.cornell.edu - Secure Shell 0.8.22
Welcome to Secure Shell version 0.8.22.
Answers to Frequently Asked Questions: http://goo.gl/m6Nj8
Connecting to lv39@ssg.vrdc.cornell.edu...
Loading NaCl plugin... done.
Password:
Last login: Mon Aug 19 15:42:18 2013 from lv39-ws.ilr.cornell.edu
-----
Welcome to the Social Science Gateway (SSG),
for help, send email to ssg-help@cac.cornell.edu
-----
ssg:~> █
```

Access via NX

What is NX?

NX is software similar to Windows Remote Desktop, allowing for a graphical interface to be made available remotely.

- ▶ Client is free (provided by Nomachine)
- ▶ Clients can be launched by installing dedicated client (all OS)


Important note

NX on ECCO security

You **MUST** download the custom-configured session from the VRDC website; the default session configuration from the NX client install will not work.


Details: we use a custom SSH key for the NX client, for some minimal additional security.

Important note


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VirtualRDC @ Cornell
 Social Science Gateway, Synthetic Data Server, and more

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Step 4: Using ECCO

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First, if you have not already done so, verify that you have changed your original password, as per Step 2. You only have to log onto the Social Science Gateway using SSH once in order to change your password. Subsequent connections can be made using SSH or NX.

SSH vs. NX

Although you can use SSH with X11 from your university desktop, the latency will not be great, especially for the SAS or Stata GUI. For that reason, we suggest using NX.

- Launch the web interface to NX for easy access (requires Java).

While the web interface will serve most people's initial needs, you may want to leverage a larger screen on your computer, or encounter restrictions with some graphical applications (SAS is a notorious culprit). If that is the case, proceed with the full client install for NX. The Nomachine NX client is free to use.

- If you do not already have NX installed, follow download and installation instructions at <http://www.nomachine.com/documents/clientinstall.php>. You should choose the NX client for the "platform" of your desktop computer (i.e., if you are using a Windows computer to access ECCO, you should download the Windows client).
- If using Mac OS X 10.6 or higher, you need to follow these alternate instructions.
- Once you have NX installed, you need to configure a "session". We have prepared a pre-configured NX session config file, downloadable from here. You should unzip it. The file contained within, called "ECCO.nxs" (or "SSG.nxs"), should be put into the NX configuration
 - \$HOME/.nomachine (Linux, Mac)
 - C:\Documents and Settings\YOUR_USERNAME\nxconfig (Windows XP and previous)
 - C:\Users\YOUR_USERNAME\nxconfig (Windows 7, maybe Vista)
- You can now open the "NX Client for Windows" (or ... for Linux or ... for Mac), and should see a sessions called "SSG". Open that, and when prompted for a password, use your ECCO password

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Logging on



Successful connection

