Working from Home

Fall 2008

1 Introduction

Fun fact: It is possible to remotely log in to the CS department's Linux machines from anywhere, using a system called ssh. This means that, using only your ingenuity and the techonology at your disposal, you can log into one of the Sun Lab machines and run commands in the terminal shell from your computer in your dorm room.

Why would I want to do that? Well, it's pretty cool. And you'll be able to do your homework at home, move the files to the CS file system, and hand them in *without leaving your room to come to the CIT*. All you have to do is follow these slightly complicated instructions. It may seem like a hassle, but it will probably be worth it.

Let's get started

2 Download the software

OS X, Linux, *NIX

If you run OS X, you already have all the software installed that you need, so you can go onto the next step: Creating a Key.

If you run Linux, most distributions ship with openssh installed by default, if not, grab that package from your package manager. Proceed to Creating a Key.

If you happen to be a user of a Debian based distribution such as Ubuntu, then please make sure that your version of OpenSSH is up to date, more recent than May 2008.

If you're running some other Unix or BSD varient, then just make sure you have openssh installed and you probably could guess the rest of the steps for this. Proceed to Creating a Key.

Windows

You'll need four programs to accomplish your mission if you run Windows. They are:

- PuTTY - this is an ssh client. It will allow you to log in to the department machines. You can download it here: http://www.chiark.greenend.org.uk/ sgtatham/putty/download.html
- PuTTYgen - this allows you to create a key that you will need to authenticate to the system and use PuTTY. Conveniently, it can also be downloaded at the above location
- Pageant - this is an authenication agent that will use the key generated by PuTTYgen. You can also get this from the same site
- WinSCP - this will allow you to transfer files from your home computer to the CS filesystem. It can be found here: http://winscp.net/eng/download.php (you want WinSCP 4.1.6 Installation Package)

PuTTY, PuTTYgen, and Pageant are standalone .exe programs that do not need to be installed. Once you've downloaded them, they're ready to use. You'll need to install WinSCP, but we'll get to that later.

Other Operating Systems

In general, if you're a huge fan of OS/2, Windows 3.1, or maybe BeOS, well then I suggest that you can follow these instructions as best you can and adapt it to your unique situation. Maybe someone in the back row of the Sun Lab would enjoy hearing the tale of your efforts.

3 Create a key

Windows

1. Create a folder somewhere on your computer called "puttykeys".
2. Open PuTTYgen.
3. In the Parameters section (at the bottom of the window) choose the SSH-2 RSA option.
4. Time to make some keys! Press the "Generate" button.
5. You'll be asked to generate some randomness by moving the mouse around the blank area in the Key section. Do it. As the progress bar fills in, your mouse movements will be translated into a random key.
6. Eventually, the program will have enough input to generate a key. Enter a passphrase in the "Key passphrase" box, and repeat it in the "Confirm passphrase box". This can be anything, but remember to make it memorable and secure!
7. Press the "Save public key" button. Save it as "csfs.pub" in the puttykeys folder you created.
8. Now press the "Save private key" button. Save it in the same folder as "csfs.ppk" (PuTTYgen should add the .ppk file extension automatically).

9. You'll need to bring the public key file (csfs.pub) to the Sun Lab. Recommendations: email it to yourself or bring it on a flash drive.

OS X

1. Open a terminal, by going to `Applications`→`Utilities`→`Terminal`.
2. Type the following command and press return: `ssh-keygen -t rsa`
3. The program will first prompt you where to save the key file. The default is your `.ssh` directory, which is what you want, so just press return.
4. The program will then prompt you for a password, or *passphrase*. It is optional, but *highly* recommended, because it protects your key in the event it is compromised (for example, if your laptop is stolen). Choose a long and strong password. You will have to enter it again for confirmation.
5. Two files will be created in the `.ssh` directory in your home directory: a **public key** file, and a **private key** file. The public key file ends in `.pub` and you will need to copy it to a department computer. The private key file *doesn't* end in `.pub` and **must not** be copied anywhere.
6. Copy your public key file to your desktop by typing the following command and pressing return: `cp ~/.ssh/*.pub ~/Desktop`
7. You'll now have a `.pub` file on your desktop. You'll need to copy this to a department machine somehow. Probably the easiest way is to email it to yourself.

Linux, and other Unix

1. Open a terminal and type the following command: "ssh-keygen -t rsa"
2. When you are prompted to enter a place to save, hit return, you don't want to enter anything here.
3. Now at the following prompt type in a password. This should **not** be the same as your log in password
4. You'll need to bring the public key file which should be in the .ssh directory of your home directory to the Sun Lab. It will likely be called something along the lines of id_rsa.pub.

4 Meanwhile, at the Sun Lab...

1. If you emailed your public key file to yourself, download and save it in your home directory.
2. Open a terminal shell.
3. Type the following command and press return: `ssh-key-setup` ***`key`*** (where ***`key`*** is the name of the public key file that you copied from your computer).

Good work so far. Isn't this fun?

5 What do I do from here?

OS X

Back on your Mac: Connecting

1. Open a terminal, as before.
2. Type the following command and press return: `ssh` *`jcarberr`*`@ssh.cs.brown.edu` (where *`jcarberr`* is your CS login name)
3. You will be prompted to enter the passphrase that you chose when generating the key.
4. Once you have entered your passphrase you will be connected to one of the Sublab computers. You can use it as if you were sitting in the Sunlab.

If this did not work, please come find the Sun Lab consultant who sits at the first computer right when you walk into the Sun Lab. They should be able to help you make sure it is working.

Advanced: X11 forwarding X11 forwarding allows you to use graphical applications like Dr. Scheme or Eclipse remotely.

1. Launch X11 on your Mac, by going to `Applications`→`X11`.
2. A terminal window will automatically launch.
3. Type the following command and press return: `ssh -X` *`jcarberr`*`@ssh.cs.brown.edu` (where *`jcarberr`* is your CS login name) (also note the `-X` which enables X11 forwarding)
4. You will be prompted to enter the passphrase that you chose when generating the key.
5. Once you have entered your passphrase you will be connected to one of the Sublab computers. You can use it as if you were sitting in the Sunlab. Any graphical application you run, like Dr. Scheme or Eclipse, will be forwarded over your SSH connection and display on your Mac.

Linux and other Unix

You are already running X11, so you are pretty well off. Just fire up a terminal and type "ssh -X mylogin@ssh.cs.brown.edu"

As long as this works and everything is configured correctly, all of the grahpical applications will automatically forward.

Windows

Windows just isn't as simple to set up for X forwarding because Microsoft doesn't have X11 by default.

1. Back on your home computer, open PuTTY.

2. In the "Host Name (or IP address)" box, enter "ssh.cs.brown.edu"
3. In the "Connection type" section, select SSH.
4. In the Category menu on the left side of the window, click on "SSH". Make sure that the number 2 is selected in the "Preferred SSH protocol version" section.
5. Click on the minus sign next to "SSH" in the Category menu to expand this category. Click on "Auth".
6. Check the check boxes next to "Attempt authentication using Pageant" and "Attempt keyboard-interactive auth".
7. Press on the Browse button. Find where you saved your private key (it should be named "csfs.ppk" and select it.
8. Now press on "Session" in the Category menu to return to the main screen. Type "Brown CS" in the "Saved Sessions" box, and press the save button to store these settings.
9. You can close PuTTY for now.

6 Copying files back and forth

Now that we have everything going for ssh, let's make it really easy for us to transfer files back and forth between our home machine and the Sun Lab.

Windows

1. Open winscp404setup, the WinSCP installer.
2. Press next twice to accept the Liscence Agreement. Choose Custom installation.
3. Accept the default destination (or change it, if you really want to).
4. At the Select Components screen, uncheck everything except WinSCP application (you already have Pageant and PuTTYgen).
5. Do what you like for the next two screens, but make sure you leave "Register to handle sftp:// and scp:// addresses" checked on the Select Additional Tasks screen.
6. Choose the Norton Commander interface. Press Install.
7. Open WinSCP.
8. In the "Host name" box, type "ssh.cs.brown.edu". Enter your login in the "User name" box, but leave the "Password" box blank. Press the "..." button next to the "Private key file" box, and find your private key (csfs.ppk). Make sure the File protocol section is SFTP, and that the "Allow SCP fallback" box is checked.
9. Press the Save button. Accept the default session name (login@ssh.cs.brown.edu).
10. Close WinSCP.

OS X, Linux, and other Unix

To copy things back and forth for these systems there are a multitude of ways. If you have a favorite graphical scp client let us[1] know so we can update this. Othewrise you can take your favorite cp command that you use at the terminal and if you add an s so it becomes scp. To get all the varying options and abilities that scp has, from a terminal type "man scp". Here's an overiew of how to use it.

Like cp, scp takes as its first argument the file to copy and as its second argument the destination. Now, because we are doing this between the sun lab and our home computer it becomes a little different. Save I have a file in my home directory on the CS department called hw07 and I want to bring it to my local computer. I would type:
"scp rmustacc@ssh.cs.brown.edu: /course/hw07 ."

There are a few important parts to the first command here. Note how I had to write "rmustacc@ssh.cs.brown.edu". This told the command that the file we wanted was in the sun lab. Next I put a colon. This is very important, it tells the program that everything before it is what computer the file is on, and everything after it is where the file exists on that computer. Now the second argument was just a simple period. This told it to put it in my current directory on my local machine.

Now let's take a look at what we can do to put files back in the sun lab. Say I've been working on a project and have a directory off files I want to put there, I would type:
"scp -r /documents/myhomework rmustacc@ssh.cs.brown.edu: /course/cs017".

Because I wanted to copy the entire directory and everything inside of it, I had to add a "-r" to the command. Now this time, because the files I wanted were on my machine, I put that first. Then because I wanted to put it onto the sun lab machines, they became the second argument.

This takes a bit to get used to, but can be extremely powerful. If you have questions, remember you can always ask your friendly neighborhood consultant. They are the person that sits at 9a in the Sun Lab.

7 Use your new powers

So let's say you wanted to hand in a homework assignment from your own computer. We'll use the CS17 Homework 3 as an example. Just follow these easy steps:

1. Open Pageant. It may appear that nothing happened, but if you look closely, the Pageant icon was added to the notification area on the right side of the taskbar. Double click on this icon to open the pageant screen.

2. Press the Add Key button. Find your private key (csfs.ppk), and select it.

3. You will be asked for a passphrase. Type in the passphrase you chose for the key.

[1] rmustacc at cs.brown.edu

4. Press the Close button. Pageant will continue to run in the background, and its icon will remain in the notification area.

5. Open WinSCP. Select your stored ssh.cs.brown.edu session, and press the Login button. You'll see some status messages, and then the WinSCP interface should open. The left side of the screen represents your computer, and the right side represents the CS Filesystem.

6. Transfer your homework to the Filesystem by finding your homework files on the left side of the screen and dragging them to the proper folder on the right side of the screen. In this case, that would be home/login/course/csci0170/homeworks/hw03.

7. Wait for the files to finish transferring, then close WinSCP.

8. Now you need to run the handin script. Open PuTTY, select the Brown CS stored session, and press the Open button.

9. Enter your login. You should see a bunch of messages scroll across the screen, followed by something like "cslab3b /u/login % ". This means that you are logged in to the second computer in the third row of the sunlab. Crazy, right?

10. cd into the directory of the assignment you want to hand in. In this case, you would type "cd course/csci0170/homeworks/hw03". Run the handin script (csci0170-handin).

11. You're done! Log out of PuTTY by typing "logout".