## INSTALLING AN SSH / X-WINDOW ENVIRONMENT ON A WINDOWS PC

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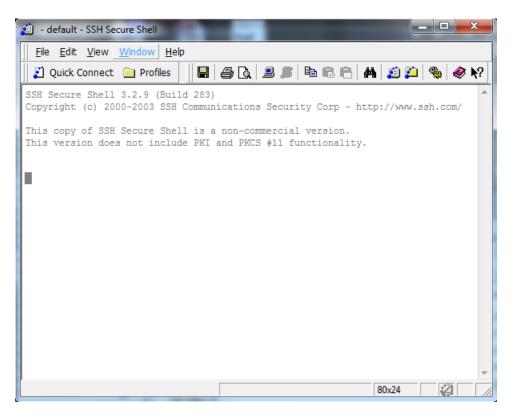
#### Installing Secure Shell (SSH) Client

The first thing you will need is SSH. SSH is a program for accessing UNIX/Linux servers on the internet, and it allows you to type commands as if you were sitting at the servers directly. You must have an account on the server, and for security purposes SSH encrypts all commands as well as passwords. As a user, you will run an SSH *client* to connect to an SSH *server* on the internet.

Many free SSH clients are available, but I find that "Secure Shell Client 3.2.9" by SSH Communications Security is the easiest to use. It is old, and the company hasn't updated the software in some time. Nevertheless, it has the functionality we need, and the program is free for non-commercial and academic users. While the program is not supported, you can find it many places on the internet, including the link below:

http://folding.chemistry.msstate.edu/files/win-x11/ssh\_client-3.2.9.exe

This program can be installed like any other Windows program. Windows 7/Vista may complain that the program did not install correctly, but that's okay. Test it to see if it runs, and if it you get the screen below, everything worked fine.



# Configuring SSH to Accept X11 Forwarding

The next thing you need to do is to enable X11 forwarding as a default options on your SSH client. This can be done on an individualized basis per server, but it's easier to enable it by default.

To start, open "SSH Secure Shell Client" and select Edit  $\rightarrow$  Settings... from the menu. You should see a menu similar to what is shown below. Under "Profile Settings  $\rightarrow$  Tunneling" make sure that "Tunnel X11 Connections" is checked (shown below).

Settings						23
Profile Settings     Onnection     Connection     Authentication     Colors     Keyboard     Tunneling	Configure secure outgoing tunnels that are initiated from the local computer to the server. Communication will be secured between the local computer and the server, but insecure beyond the server. The settings will take effect upon next login.					
File Transfer     File Transfer     Global Settings     Global Settings     Font     Colors     Messages     User Authentication     Keys	н	Outgoing Incoming	Listen Port	Dest Host	Dest Port	Allow
Certificates     SSH Accession     SSH Accession     PKCS #11     Configuration     Server Authentication     Host Keys     CA Certificates     DAP Servers     CAC entificater     Advanced     Advanced	•	Add X11 tunneling Enable secure tunne has to be also runnir I Tunnel X11 con	eling for X11 gr			
()ssh			OK	Canc	el l	Help

Similarly, from the main window, select "Profiles  $\rightarrow$  Edit Profiles." Then, select "Quick Connect," and find the Tunneling tab (shown below). Here again, make sure the "Tunnel X11 connections" is set. Note that you won't have any other profiles defined in your software, so you can ignore the profiles that I have listed below.

Profiles	X
Quick Connect Profiles Profiles	Connection         Cipher List         Authentication         Keyboard           Colors         Tunneling         File Transfer         Favorite Folders           Configure secure outgoing tunnels that are initiated from the local computer to the server. Communication will be secured between the local computer and the server, but insecure beyond the server.           The settings will take effect upon next login.           Outgoing         Incoming           Name         Listen Port         Dest Host         Dest Port         Allow
	Add       Edit         Add       Edit         Remove         X11 tunneling         Enable secure tunneling for X11 graphic connections. An X server has to be also running in passive mode on the local computer.         Image: Tunnel X11 connections
	OK Cancel

When you have finished this, click okay, and confirm that you want to save your changes.

#### Creating a Quick Connect Profile

Now that the software is installed, you should make sure that it's working. Select "Quick Connect" from the main window, and enter the server name and your user name for that server. When you click Okay, you may be presented with a window asking you whether you want to add the encryption key to the local database. Select "Yes." Provided that the server does not change, you will never be asked this again for this connection. An example of the prompt is shown below:



After you click "Yes," you will be asked for your password. Enter it, and you should be logged in. You will see a new window pop up, asking you to save this session into the profiles. If you enter a name here (e.g. the name of the server) you will be able to connect more quickly in the future by selecting "Profiles  $\rightarrow$  Server Name." Creating a profile remembers the server address as well as your user name, but for security reasons it does not remember your password.

🧃 rabi.chem.msstate.edu - default - SSH Secure Shell						
Eile Edit View Window Help						
📗 🛃 Quick Connect 🦳 Profiles 🔄 🖶 🎒 🔂 🚛 🍠 🔃 🛤 📾 💼 🚔 🆓 🦓 🐶 扵						
SSH Secure Shell 3.2.9 (Build 283) Copyright (c) 2000-2003 SSH Communications Security Corp - http://www.ssh.com/						
This copy of SSH Secure Shell is a non-commercial version. This version does not include PKI and PKCS #11 functionality.						
Welcome to Ubuntu 12.04.3 LTS (GNU/Linux 3.2.0-58-generic i686)						
* Documentation: https://help.ubuntu.com/						
26 packages can be updated. 17 updates are security updates.						
Last login: Thu Dec 26 09:20:08 2013 from bloch.local						
<pre>xset: unable to open display "localhost:10.0" xset: unable to open display "localhost:10.0"</pre>						
xset: unable to open display "localhost:10.0"						
xset: unable to open display "localhost:10.0" nfitzkee@rabi:~\$						
*						
Connected to rabi.chem.msstate.edu SSH2 - aes128-cbc - hmac-md5 - nc 80x24						

At this point, you can enter any commands you like at the UNIX prompt. For a good UNIX tutorial, you can check out the following website:

#### http://www.ee.surrey.ac.uk/Teaching/Unix/

I also provide a simple UNIX Cheat Sheet for my lab, linked below. You can find many others on the web as well.

http://folding.chemistry.msstate.edu/files/win-x11/unix\_cheat\_sheet.pdf

## Configuring X11 on your Desktop

X11 is a program that allows you to run Windowed programs (like Firefox, PDF viewers, text editors, etc.) on another server. The program itself runs on the UNIX server, but the graphics are displayed on your computer. It's a very powerful feature that makes UNIX a very convenient operating system. For example, an expensive software package (like MatLab) could be installed on the UNIX server, and you could run it in a Window remotely just as if you were at the server yourself.

We need to install a program called "Cygwin" in order to install the X11 server on your machine. Note the change in vocabulary: The program, or "client" runs on the UNIX server. Its graphics commands are "tunneled" through your SSH connection so that the X11 server can process them and display them on your screen.

To install X11, you should download the following file from the Cygwin site:

#### http://cygwin.com/setup-x86.exe

This is an installer for Cygwin, although it's much more complicated than the SSH installer. It will take substantially longer, too.

To begin, run the installer, and when prompted, select "Install from Internet." Your root directory should be "C:\Cygwin." You can put it on another drive if you like (e.g. "D:\Cygwin"), but don't try to put it under Program Files, etc. You should install it for all users.

The "Local Package Directory" can be anything that's convenient. I put mine in "My Documents\Downloads\Cygwin Packages."

You can leave the download settings alone unless you know they need to be changed. When prompted for a download site, though, scroll down until do you find some academic or government mirrors. I typically use mirror.cs.vt.edu (Virginia Tech) or www.gtlib.gatech.edu (Georgia Tech). You can select multiple mirrors by holding down the CTRL key.

# Selecting Packages

The next screen you see will look something like this:

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Category New	B	S Size	Package			
🗆 All 🚯 Default						
🖽 Accessibility 😯 Default						
🖽 Admin 🚯 Default						
🖽 Archive 😯 Default						
🖽 Audio 📀 Default						
🖽 Base 📀 Default						
🗄 Database 🚯 Default						
🖽 Debug 📀 Default						
🖽 Devel 🚯 Default						
🗄 Doc 🕂 Default						
🖽 Editors 📀 Default						
🖽 Games 🛛 Default						
🖽 GNOME 😯 Default						
🗄 Graphics 😯 Default						
🗄 Interpreters 📀 Default						
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🕀 Libs 🚯 Default						
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Here, you will select the packages that you need to create a functioning X11 installation. You can also select other packages as well, but the bare minimum you packages needed are given on the next page (Table 1):

Table 1:	Packages	Needed	for <b>B</b>	Basic X1	1 Installation
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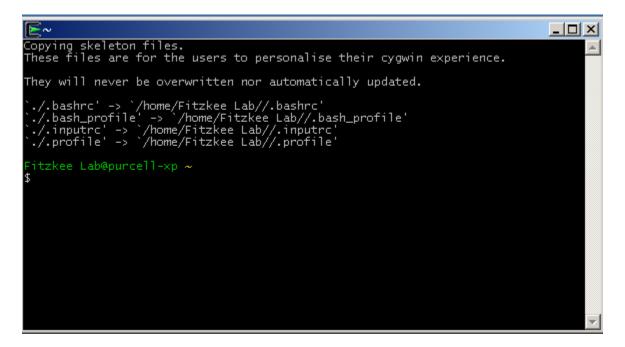
X11         • X-start-menu-icons         • xorg-server         • xorg-scripts         • xorg-server-common         • xterm         • All X fonts (start with "font-"	Net inetutils openssh openssl	Editors • vim • nano • Optional: All packages starting with "xemacs" and "emacs"
Libs <ul> <li>Leave all default items checked</li> <li>crypt</li> <li>zlib0 (if not checked)</li> </ul>	Util • ccrypt • cygutils-extra	Python (Optional) • python • python3

To select an item, click on the circular arrow icon ( $^{\textcircled{0}}$ ) until there is a checkbox in the "Bin?" column and a version under "New." You can click multiple times if there are multiple versions, and if you click the wrong line you can continue clicking until "Skip" is shown again.

When you have selected the options above, click "Next." You will be prompted with additional recommended packages. Agree to select them all, and click "Next" again.

At this point the installer will download the files needed for X11. It will take several minutes to download, and then several more minutes to complete the installation.

When the installer is finished, it will ask you to create icons on the desktop and in the Start Menu. Whether you create an icon on the start menu is up to you, but for now create one on the desktop. You can delete it later. Once the icon appears on your desktop "Cygwin Terminal," double click it to run it. We don't need to do anything here, but we want the program to create the initial directories and files on its "first time" start up (see below).



In the above window, now that it's creating a folder called "/home/XXX/." In my case XXX is "Fitzkee Lab." We need to find that file on your computer so we can copy a file there. Typically it will be "C:\Cygwin\home\XXX\." Use the explorer to find this folder, then copy the following file there:

http://folding.chemistry.msstate.edu/files/win-x11/.startxwinrc

Make sure when you save the file you do not change the name; in fact, the name of this file is more important than the content.

We're almost done, I promise!

Now that we're done, you can close the Cygwin terminal forever and delete the icon from your desktop. We won't be using it anymore in this tutorial, but you may want to keep the icon around for later.

Finally, under your start menu, find "Cygwin-X" and start the program "XWin Server." If all is well, the program will start and you will see an "X" appear in the system tray. If you are asked whether to block the program by your firewall, choose to "Unblock," otherwise the program won't work properly.

You can close X by right clicking on the icon in your system tray, and if you want it to start whenever you log in, you can add the program to the "Startup" folder in the Start Menu.

#### Testing Your Configuration

Now, the final test is to see whether X11 and SSH can both play nicely together. Once again, you want to SSH to the server. If you saved a profile last time, it should be quicker, and it won't ask you about saving the key, either.

When you reach the command prompt, type the command "xeyes." Provided everything worked, you should get a set of "eyes" that follow your mouse pointer around. If so, congratulations! If not, double check the instructions above, and if you still have questions, talk to me.

