PuTTY/Cygwin Tutorial

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Written for CS 23, Winter 2007

This tutorial will show you how to set up and use PuTTY to connect to CS Department computers using SSH, and how to install and use the Cygwin X-Windows Server to run graphical applications over the PuTTY connection.

Files You'll Need:

PuTTY (the SSH client)   http://the.earth.li/~sgtatham/putty/latest/x86/putty.exe
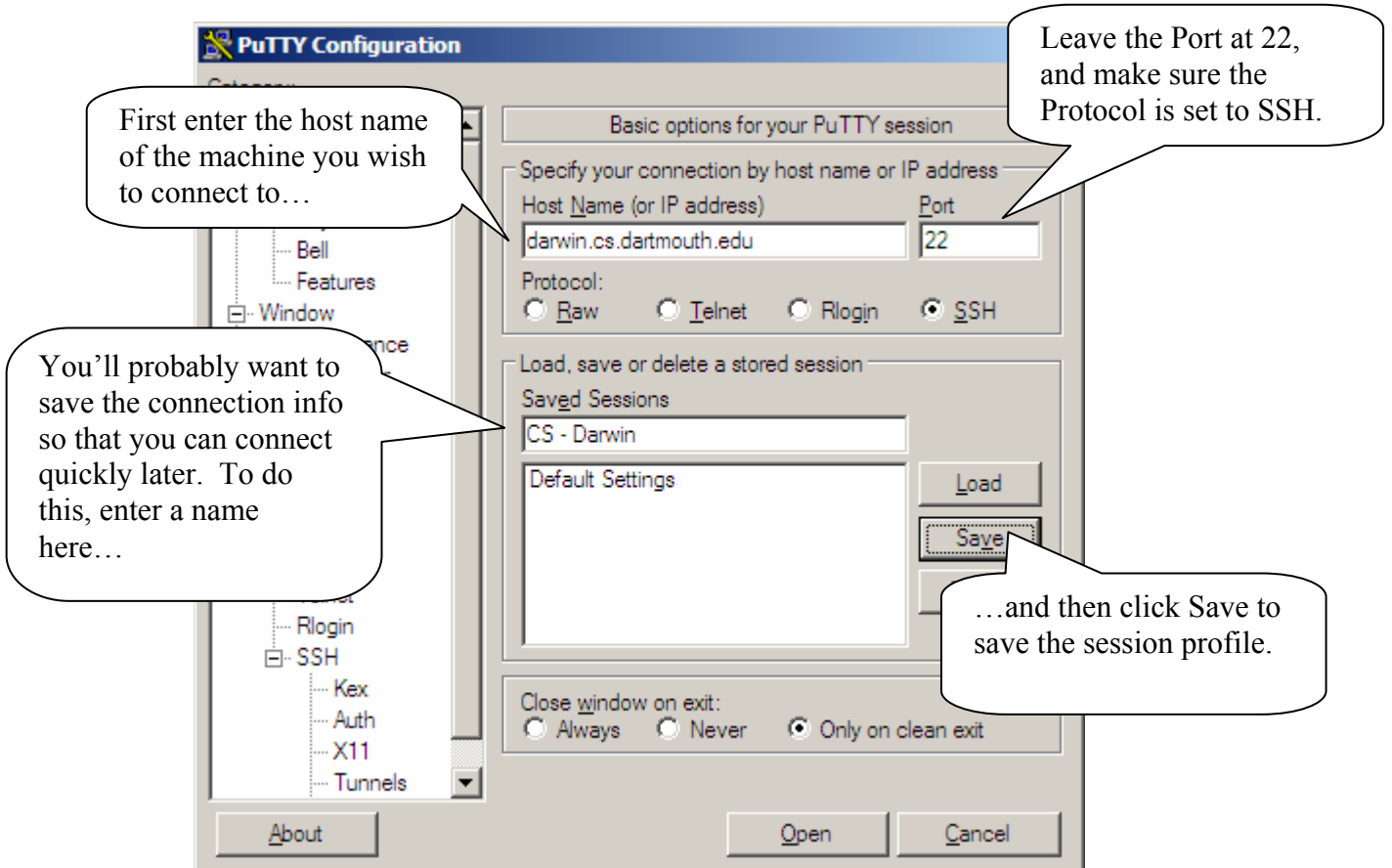**Cygwin**   http://www.cygwin.com/setup.exe

Part 1. PuTTY

Start by downloading PuTTY (not PuTTYTel, but PuTTY, as seen above). You'll want to save this file in an easily accessible location. I personally recommend the desktop, so that you're just a double-click away.
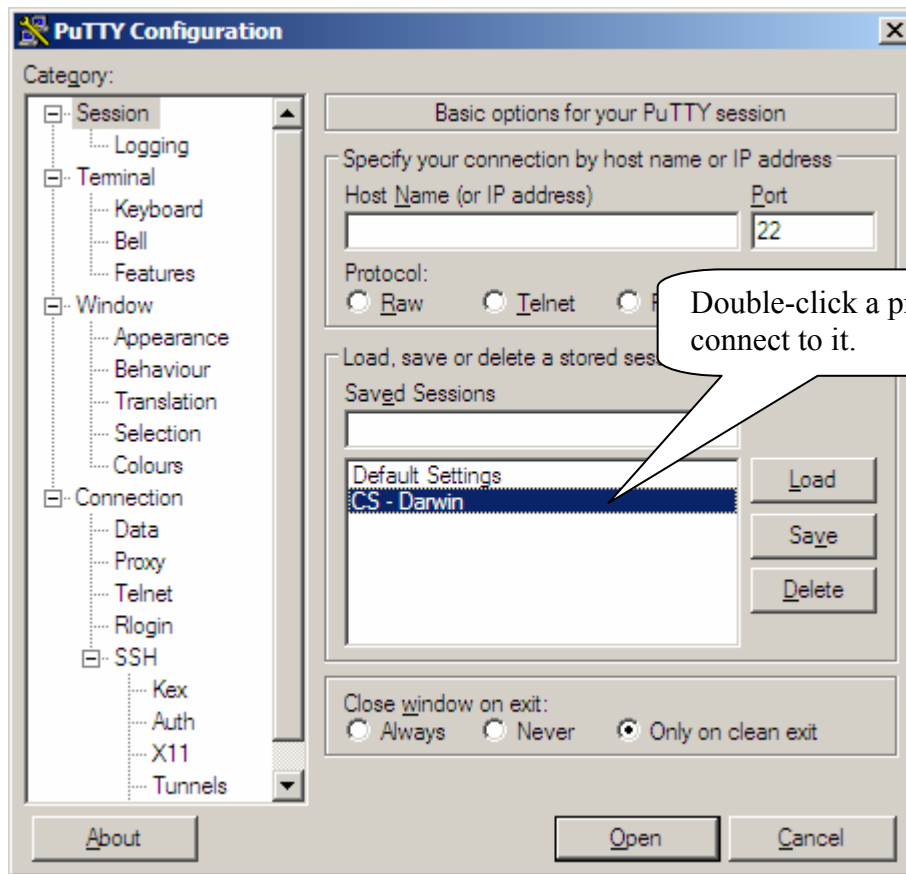
Now, let's begin! Double-click the PuTTY icon, and the PuTTY Configuration window will appear:
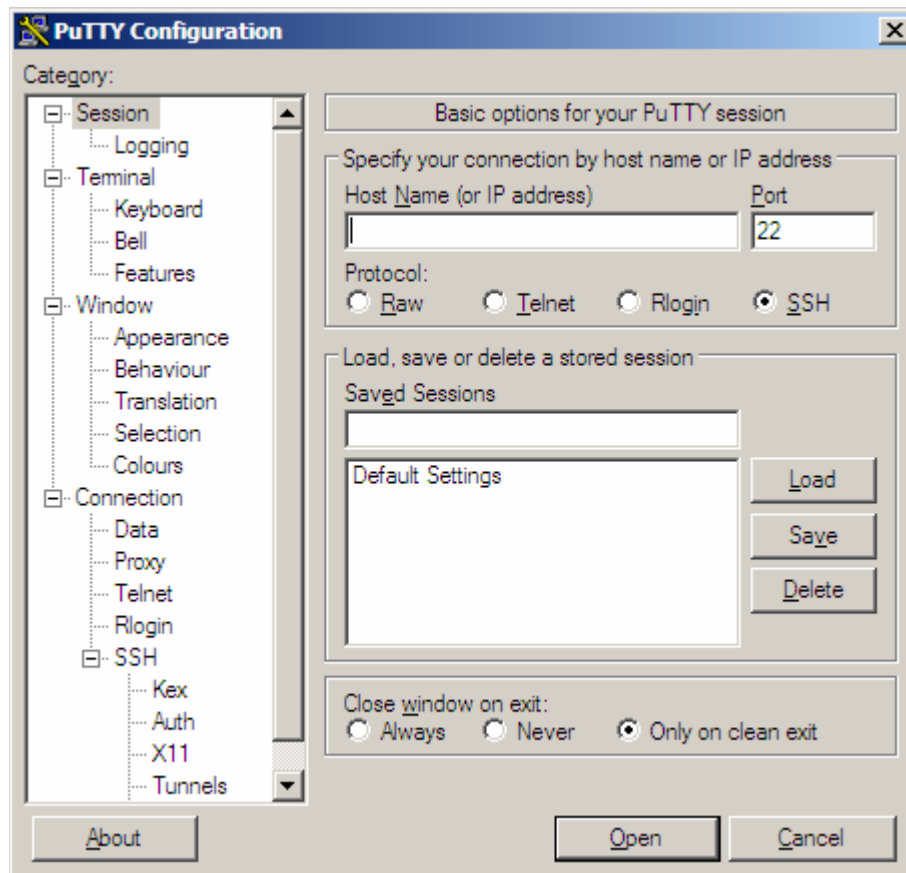
In this first portion of the tutorial, we will run PuTTY as a simple SSH client, without the use of X forwarding for graphical applications (that comes in the second part of the turorial). For now, we'll just connect with a text console.

First enter the host name of the machine you wish to connect to…

Leave the Port at 22, and make sure the Protocol is set to SSH.

You'll probably want to save the connection info so that you can connect quickly later. To do this, enter a name here…

…and then click Save to save the session profile.

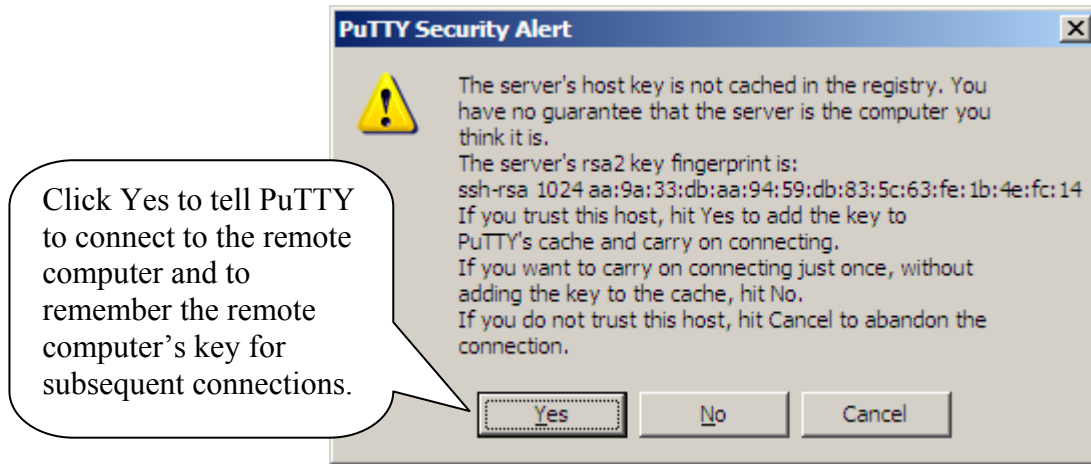When you start PuTTY in the future, you'll see that your profile is saved.

Double-click a profile to connect to it.

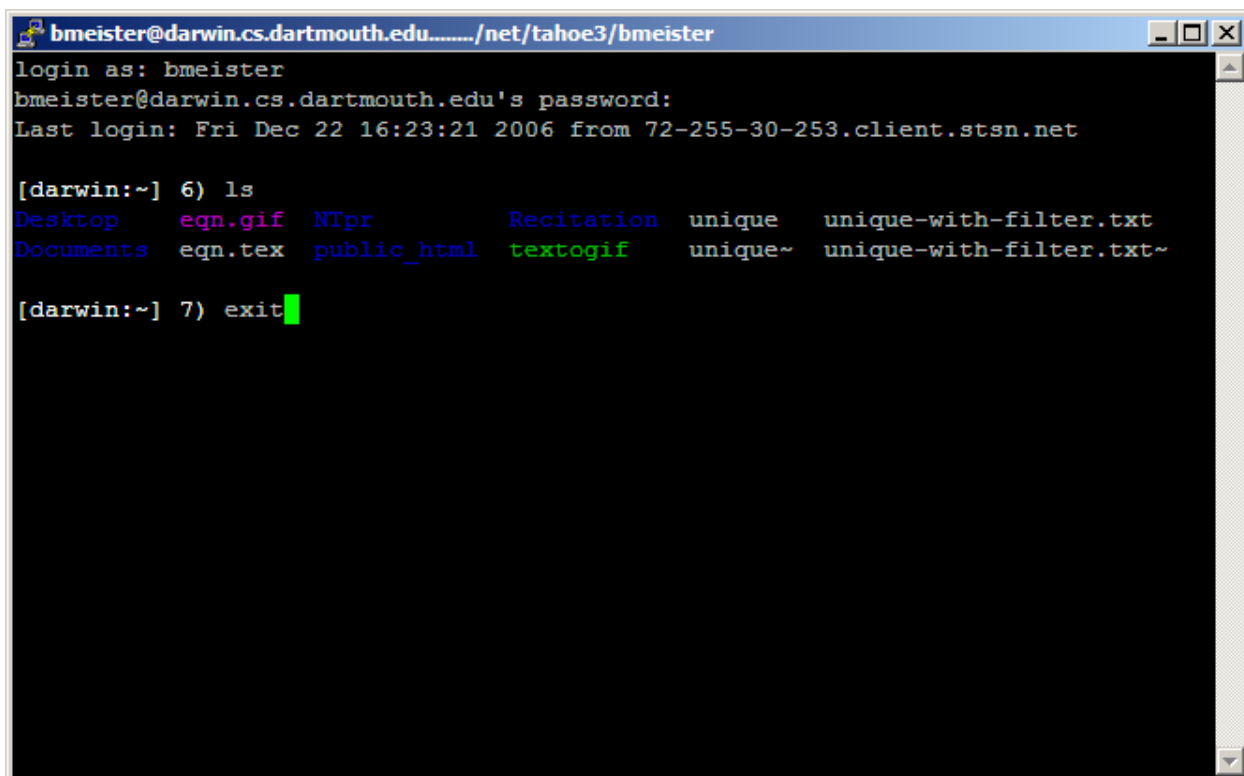| **Tip:**	You can quickly connect to a host for "just one time" by entering its host name, and clicking Open. However, if you are going to connect to a machine often, it's best to save a profile.

If you have a personal firewall, click "Allow" if it asks you whether or not putty.exe should connect to the Internet.

When you connect, you'll receive the following message box, since you're connecting to the machine for the first time.

Click Yes to tell PuTTY to connect to the remote computer and to remember the remote computer's key for subsequent connections.

PuTTY Security Alert

The server's host key is not cached in the registry. You have no guarantee that the server is the computer you think it is.
The server's rsa2 key fingerprint is:
ssh-rsa 1024 aa:9a:33:db:aa:94:59:db:83:5c:63:fe:1b:4e:fc:14
If you trust this host, hit Yes to add the key to PuTTY's cache and carry on connecting.
If you want to carry on connecting just once, without adding the key to the cache, hit No.
If you do not trust this host, hit Cancel to abandon the connection.

[Yes]   [No]   [Cancel]

Since you do trust this machine, click Yes. You will not see this dialog box on subsequent connections.

Next, you will see the "login as" prompt: enter your CS user name, and press Enter. The system will then ask you for your password: enter it, and press Enter once more. You will then be presented with the shell prompt, at which you can enter commands to be executed on the remote computer. (Here I have used the *ls* command as an example.) When you are finished, type exit and press enter to log out.

```
bmeister@darwin.cs.dartmouth.edu........./net/tahoe3/bmeister
login as: bmeister
bmeister@darwin.cs.dartmouth.edu's password:
Last login: Fri Dec 22 16:23:21 2006 from 72-255-30-253.client.stsn.net

[darwin:~] 6) ls
Desktop       eqn.gif  NTpr          Recitation  unique    unique-with-filter.txt
Documents     eqn.tex  public_html   textogif    unique~   unique-with-filter.txt~

[darwin:~] 7) exit
```
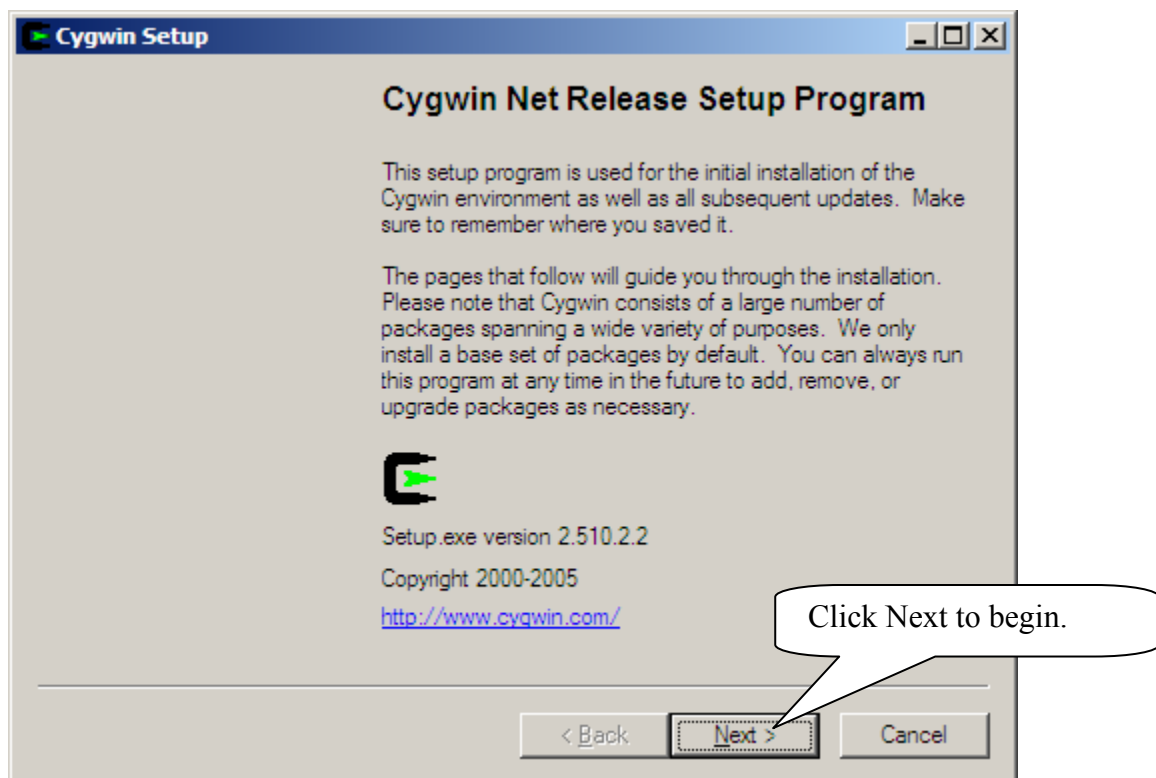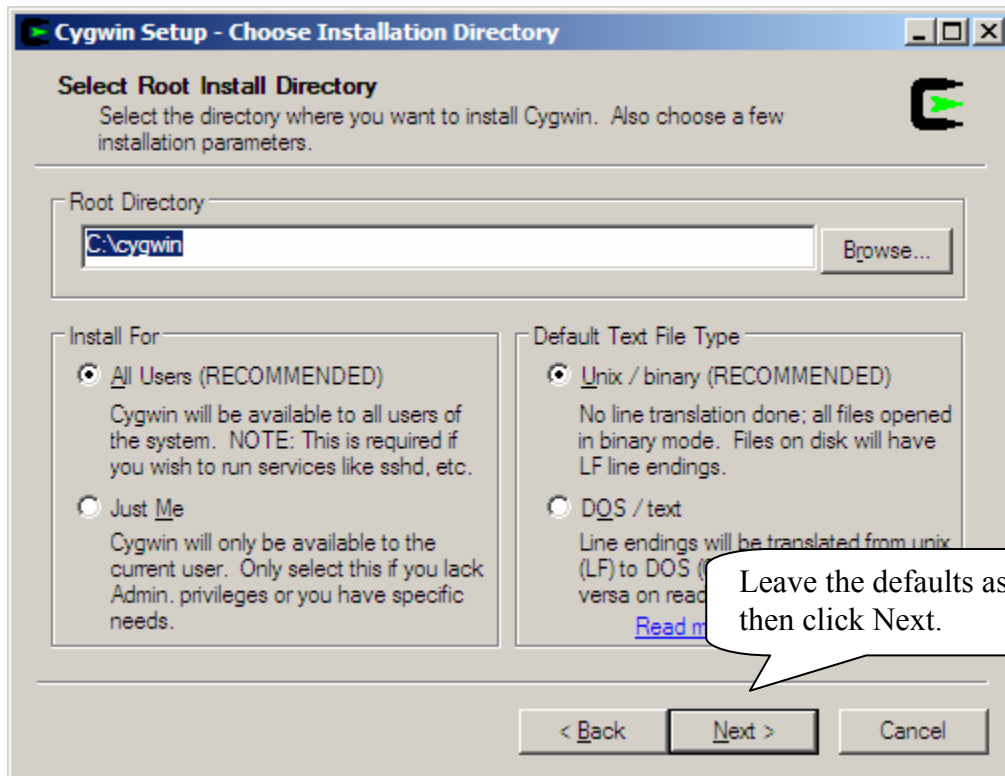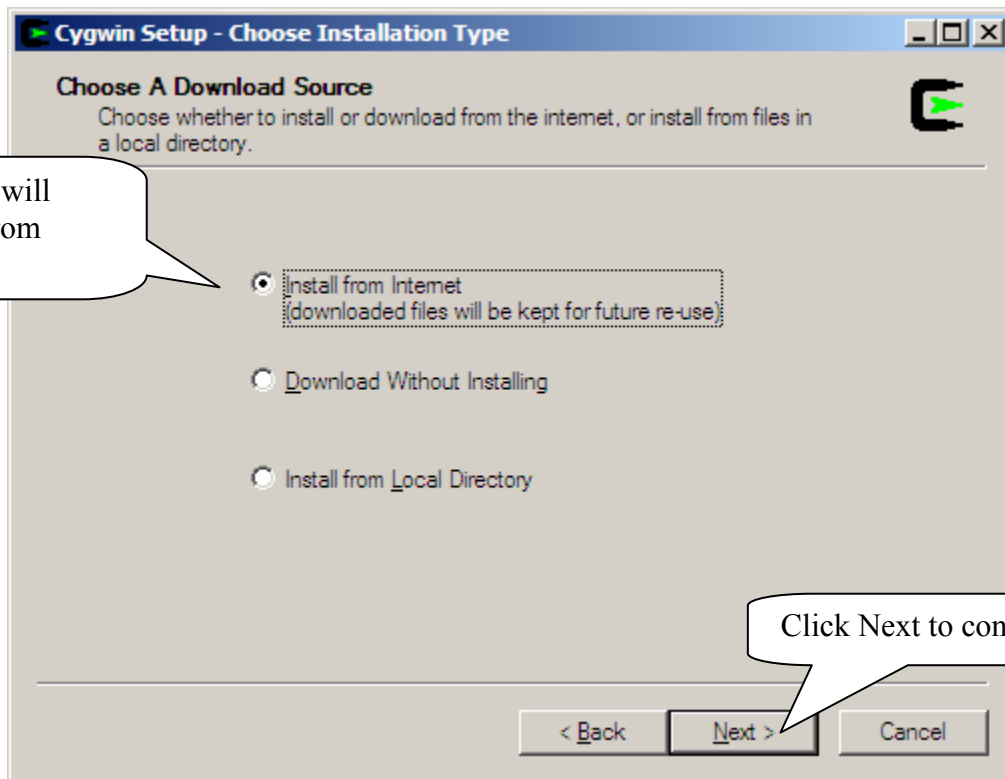
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Part 2. Cygwin/X

In this part of the tutorial, we will set up the Cygwin X-Windows Server, and enable PuTTY's X11 Forwarding Capability to run graphical applications over the network.

Background:	All graphical UNIX applications connect to an X-Windows Server to display graphical data on the monitor of the computer. The X-Windows Server is a program that acts as an interface between graphical UNIX applications and the graphics subsystem of the computer. Here, we will be setting up an X-Windows Server using Cygwin, and enabling PuTTY to forward connections from remote graphical applications to the local X-Windows Server, so that they can display data on the local monitor and get input from the local keyboard/mouse.

Cygwin is a LINUX-like environment for Windows. It provides many of the standard GNU tools and applications that one would find on a LINUX computer, as well as an environment that allows them to run within the Windows operating system. Many LINUX programs can be recompiled using Cygwin so that they can be run under Windows. |
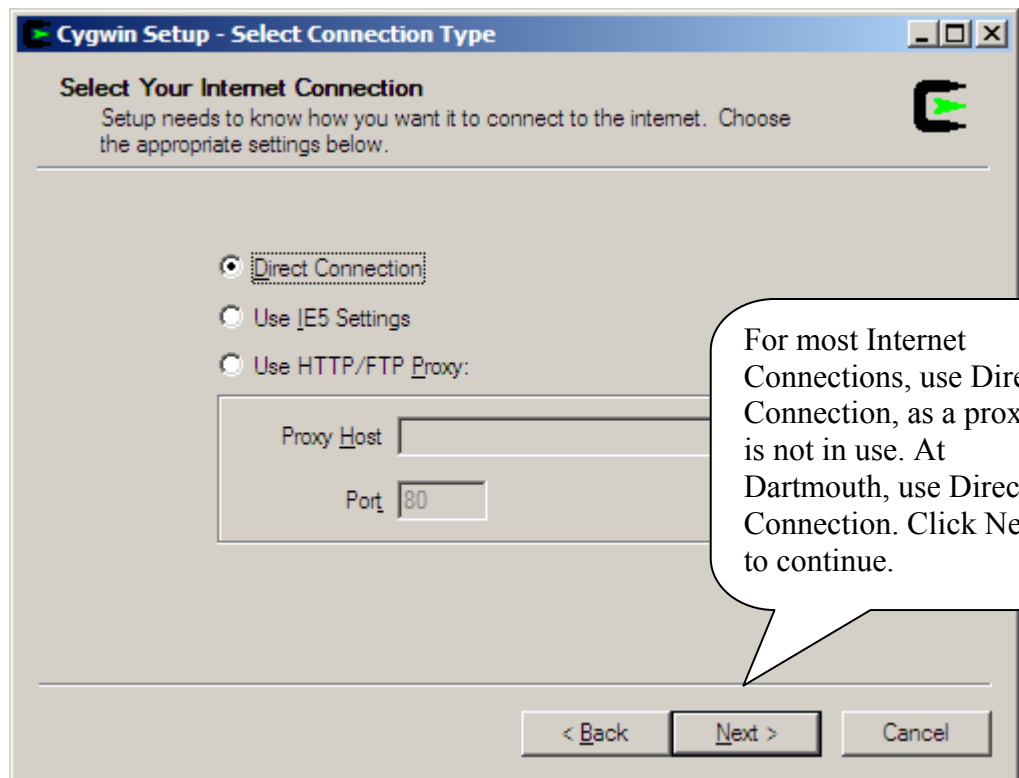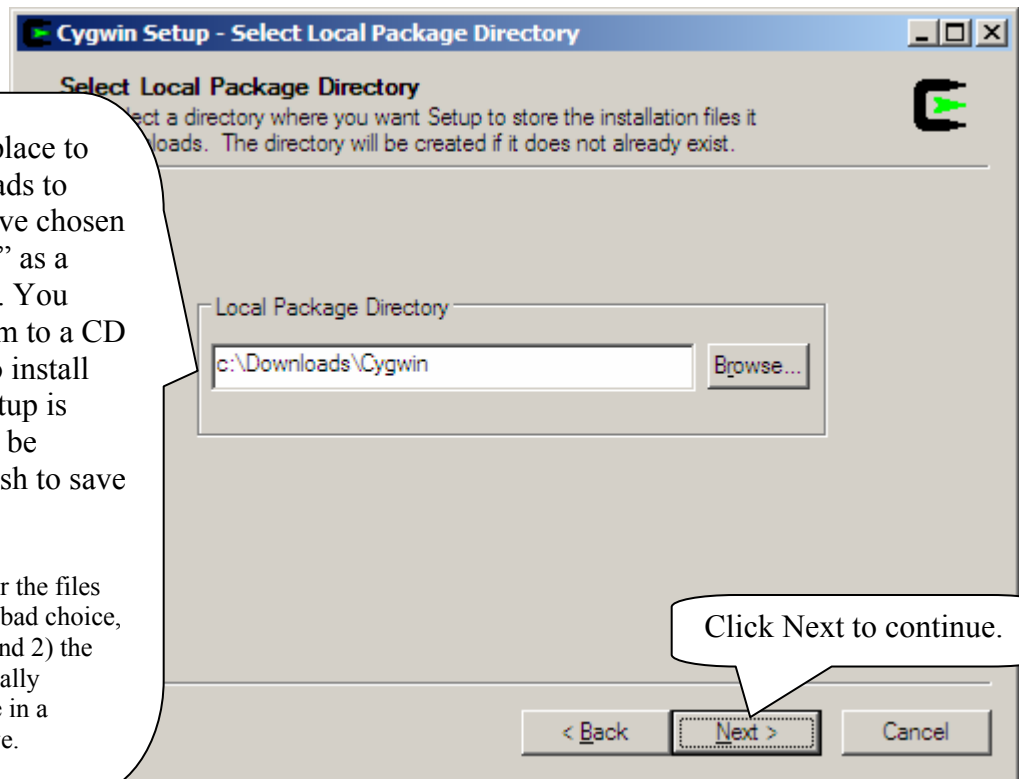
To begin, let's install Cygwin. Download the setup.exe and run it. You will see this screen:

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In this case, we will select "Install from Internet".

Click Next to continue.

Leave the defaults as-is, then click Next.

Cygwin Setup - Select Local Package Directory

Select Local Package Directory

Select a directory where you want Setup to store the installation files it downloads. The directory will be created if it does not already exist.

Cygwin Setup needs a place to save the files it downloads to install Cygwin. Here, I've chosen "c:\Downloads\Cygwin" as a place to save these files. You may choose to burn them to a CD in case you ever have to install Cygwin again. Once Setup is completed, the files can be deleted if you do not wish to save them.

Using the default location for the files without checking it first is a bad choice, as 1) it's often hard to find and 2) the Setup files are not automatically deleted, thus taking up space in a hidden corner of your C drive.

Local Package Directory

c:\Downloads\Cygwin   Browse...

Click Next to continue.

< Back   Next >   Cancel

Cygwin Setup - Select Connection Type

Select Your Internet Connection

Setup needs to know how you want it to connect to the internet. Choose the appropriate settings below.

○ Direct Connection
○ Use IE5 Settings
○ Use HTTP/FTP Proxy:

Proxy Host
Port 80

For most Internet Connections, use Direct Connection, as a proxy is not in use. At Dartmouth, use Direct Connection. Click Next to continue.

< Back   Next >   Cancel

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Cygwin Setup will now download the list of mirrors. *If you have a personal firewall, click "Allow" if it asks you whether or not setup.exe should connect to the Internet.* Select a mirror, then click Next to continue.

Select a mirror to download Cygwin from. Try to select one that's close to you. Some are faster than others. Here, I've selected ftp://mirrors.kernel.org .
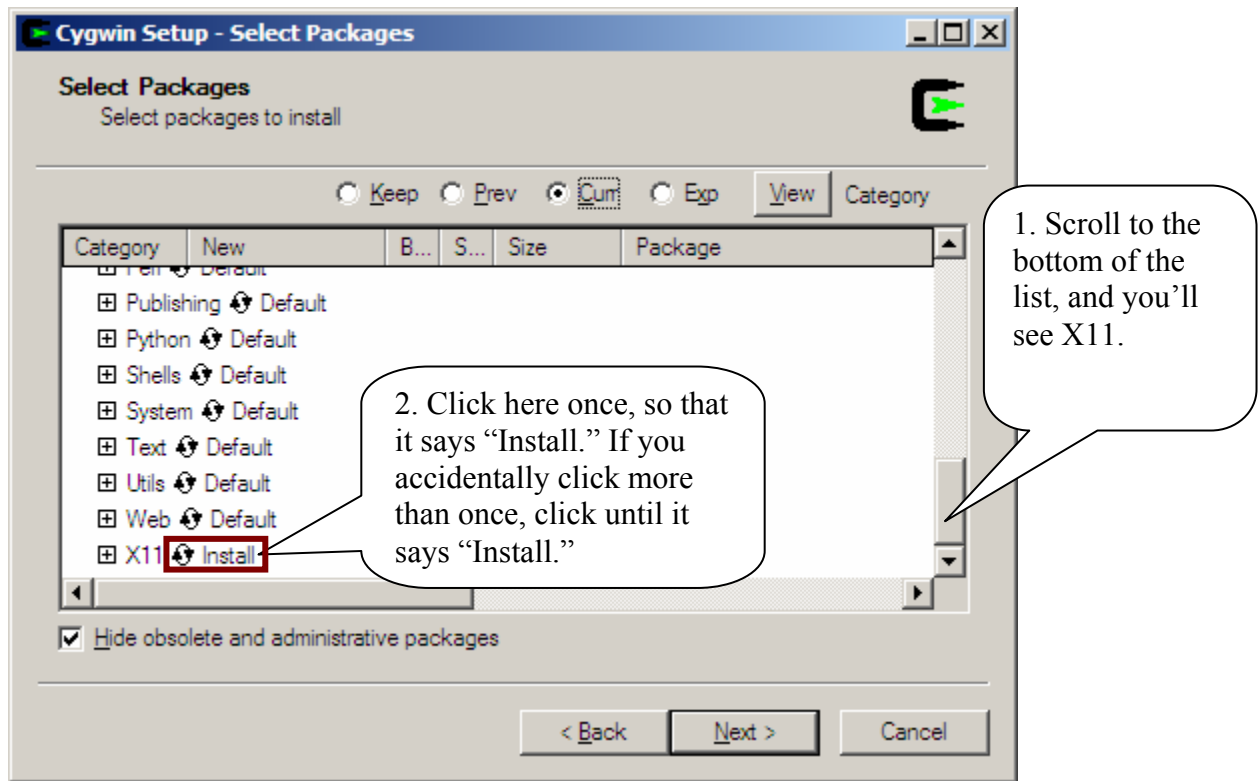
Click Next to continue.

Setup will now download the list of packages to choose from.

You may install any packages you like. For now, we'll leave it at the default, except for a slight change: let's tell Cygwin to install all of X11.

I'd personally suggest scrolling up in the list and installing the Devel packages as well (by the same method), as this will allow you to compile and run many UNIX programs on your Windows computer. If you would like to use *emacs*, *xemacs*, or *vi/vim* locally on your Windows computer, install the Editors packages. Additional packages can be installed later by re-running Setup.exe.

When you're finished, click Next to continue.

Cygwin will now download and install the selected packages.
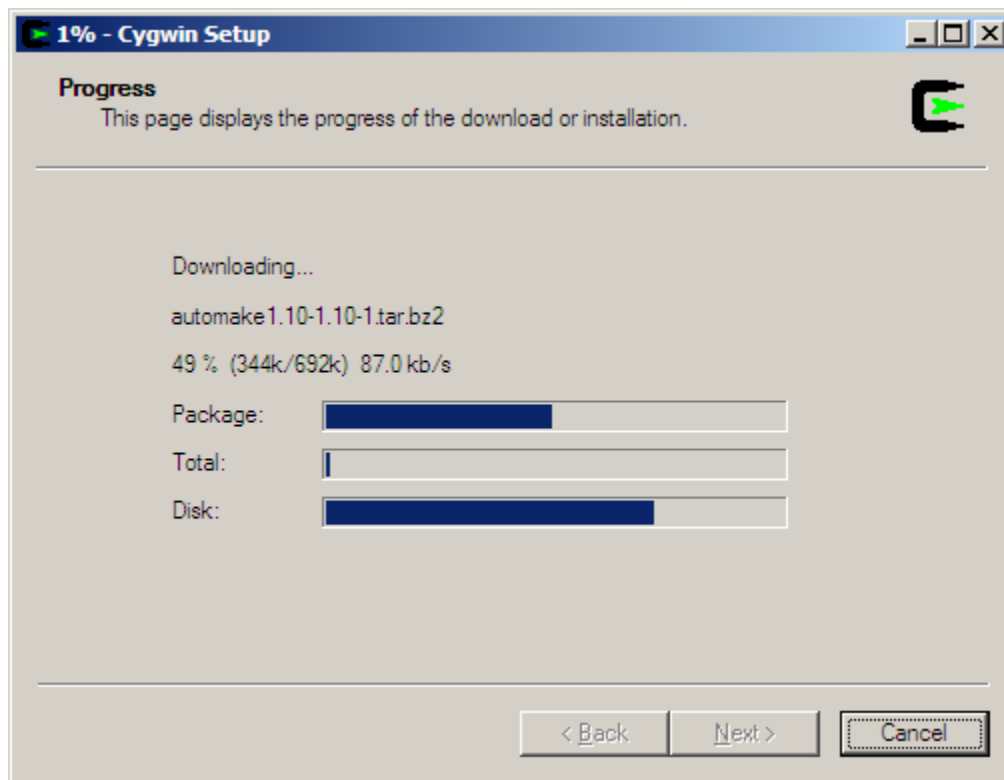
The Cygwin download and installation can take an *extremely* long time, especially if you're off-campus or on a slow Internet connection, or if you're installing a lot of packages. This might be the time to run over to Thayer Dining Hall!

Question: *Cygport.sh (or some other shell script) seems to be taking forever! Setup has been working on this one script for over 20 minutes!*

When this is the case, it may mean that the script (or a component called by the script) entered an infinite loop. You'll need to close the appropriate process, so that the installation can continue.

Press CTRL-ALT-DELETE on your keyboard, and click "Task Manager". Go to the Processes tab. Click the "CPU" column twice, so that processes are sorted in descending CPU Usage order. Now find the process that's using all of the CPU (most likely *bash.exe* or similar), select it, and end it by clicking "End Process."

Use Task Manager to end the offending process.

If Cygwin setup stalls at a shell script (.sh)…

Here, *bash.exe* (the shell script interpreter) is the offending process. It's taking up all the CPU (94%), and it's been running for 22 minutes!
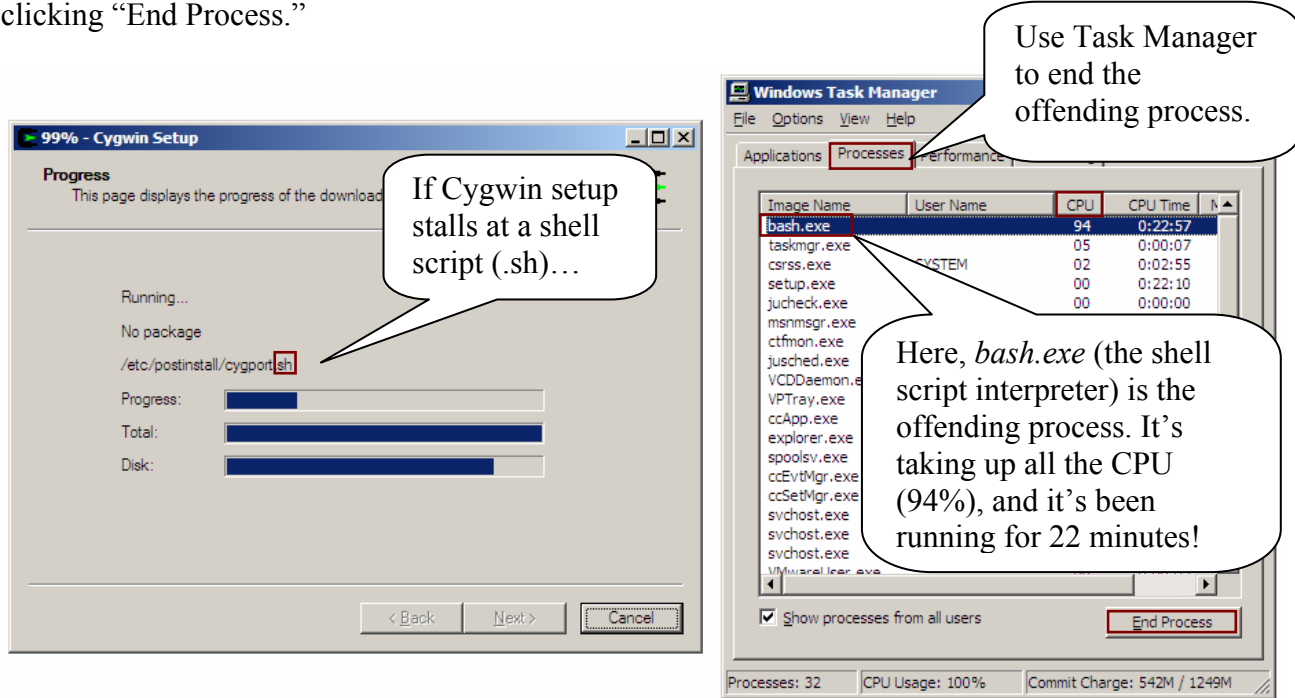
N.B.: System Idle Process is a normal part of the system, and should not be terminated, regardless of the amount of CPU it's using or its "CPU Time". The System Idle Process is simply an accounting mechanism Windows uses to track unused CPU time. It doesn't actually "consume" CPU time.

Cygwin Setup - Create Icons

Create Icons
Tell setup if you want it to create a few icons for convenient access to the Cygwin environment.
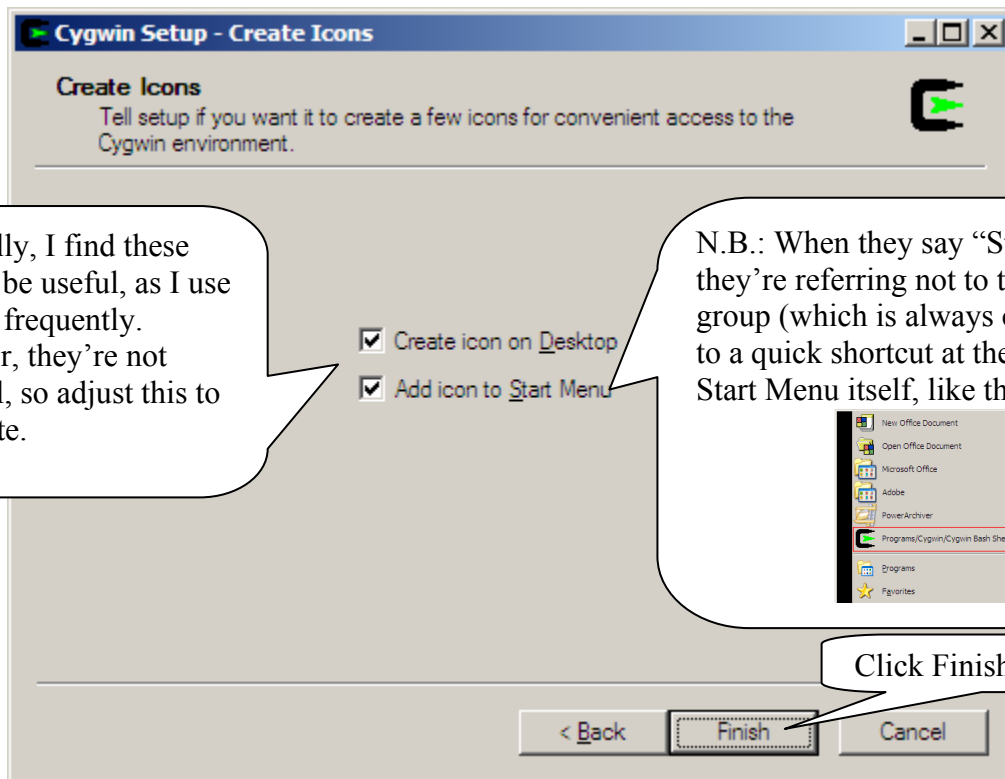
Personally, I find these icons to be useful, as I use Cygwin frequently. However, they're not essential, so adjust this to your taste.

☑ Create icon on Desktop
☑ Add icon to Start Menu

N.B.: When they say "Start Menu", they're referring not to the program group (which is always created), but to a quick shortcut at the top of the Start Menu itself, like this:

Click Finish.

< Back   Finish   Cancel

Cygwin Setup

Installation Complete

OK
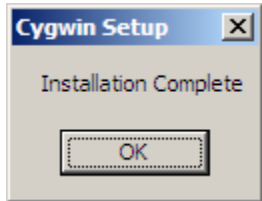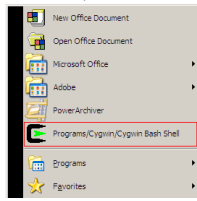
Congratulations! You've just installed Cygwin! On the next page, we'll configure Cygwin and PuTTY, and start running X apps over the network!

We need to setup the start-up script and shortcut that you'll use to access Cygwin's X-Server. To do this, our travels take us to **C:\cygwin\usr\X11R6\bin**. Go there, and you'll find a batch file called "startxwin.bat".
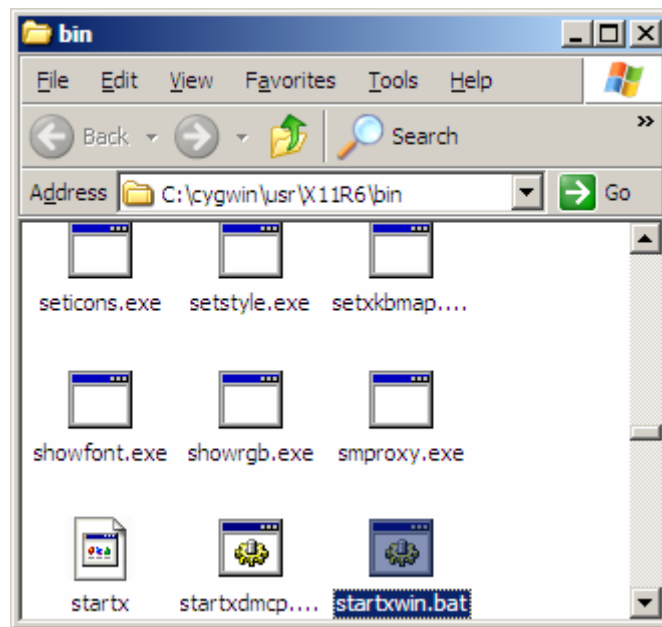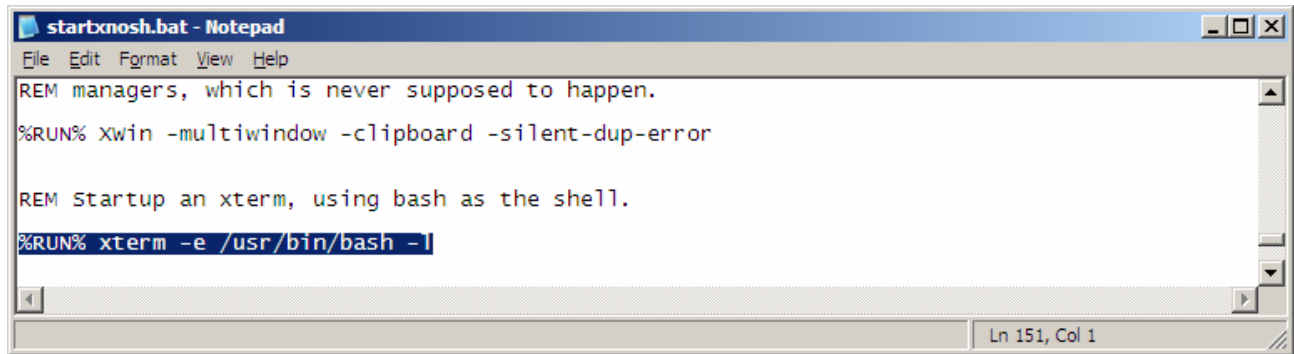

The default version of the script automatically starts an *xterm* (local *bash* shell prompt) when it loads. Let's modify this, so that we can start the X-server independently of the *xterm*.

Tip:	There are many X-windows applications that you can run locally on your system, all found in the Cygwin-X folder on your Start Menu. However, to run any of these, you'll need to start the X-Server. The edit we are about to perform allows you to do this without having to start an *xterm* each time.

Make a copy of the file in the same directory, and rename it (I recommend "startxnosh.bat"). Now, right-click the file, and click Edit to open it in Notepad.
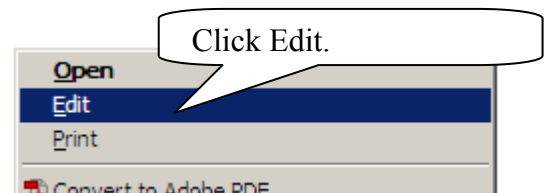
Towards the bottom of the file you'll find a line that says
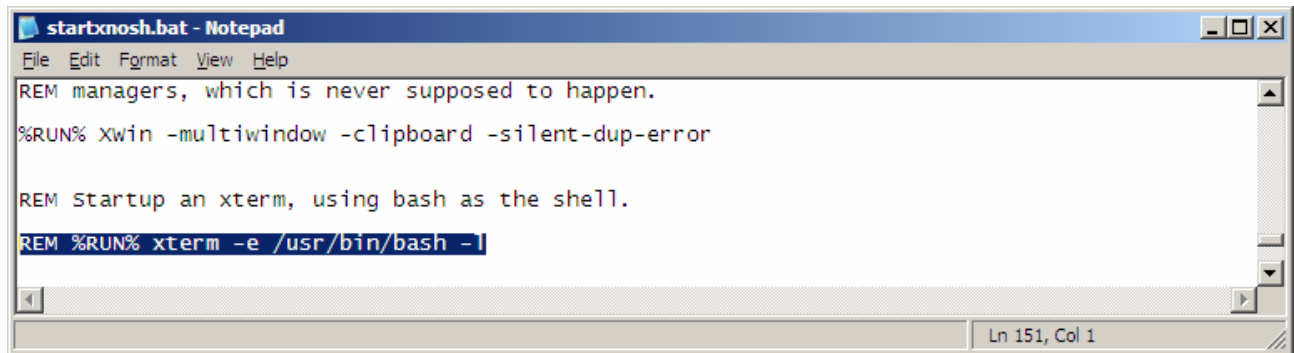"`%RUN% xterm -e /usr/bin/bash –l`"

```
startxnosh.bat - Notepad                                    _ |□| ×|
File  Edit  Format  View  Help
REM managers, which is never supposed to happen.

%RUN% Xwin -multiwindow -clipboard -silent-dup-error


REM Startup an xterm, using bash as the shell.

%RUN% xterm -e /usr/bin/bash -l

                                              Ln 151, Col 1
```

Let's comment this out (so that the statement doesn't execute) by placing the word REM before it.

```
startxnosh.bat - Notepad                                    _ |□| ×|
File  Edit  Format  View  Help
REM managers, which is never supposed to happen.

%RUN% Xwin -multiwindow -clipboard -silent-dup-error


REM Startup an xterm, using bash as the shell.

REM %RUN% xterm -e /usr/bin/bash -l

                                              Ln 151, Col 1
```
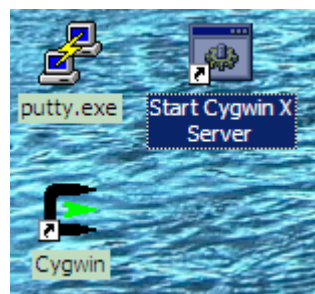
Save and close the file.

Let's make a shortcut to our new batch file, so we can access it easily. Right-click the file, and under the "Send To" menu, click "Desktop (create shortcut)".
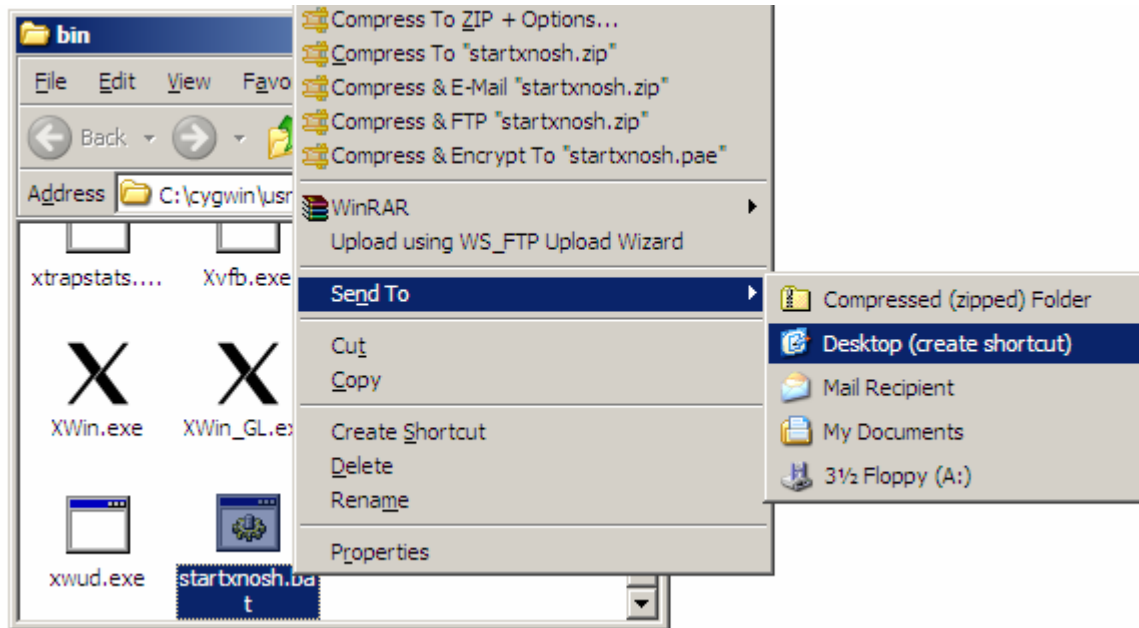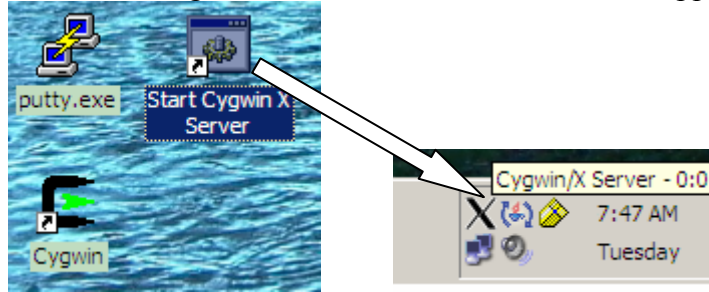

On the desktop, you'll find a new shortcut:
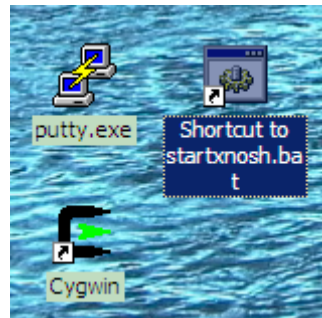
You'll probably want to rename it, so that you'll know what it is later.

Start the X-Server by double-clicking on the new icon, An *X* icon should appear in the tray.

If you have a personal firewall, click "Allow" if it asks you whether or not XWin.exe should connect to the Internet/act as a server.
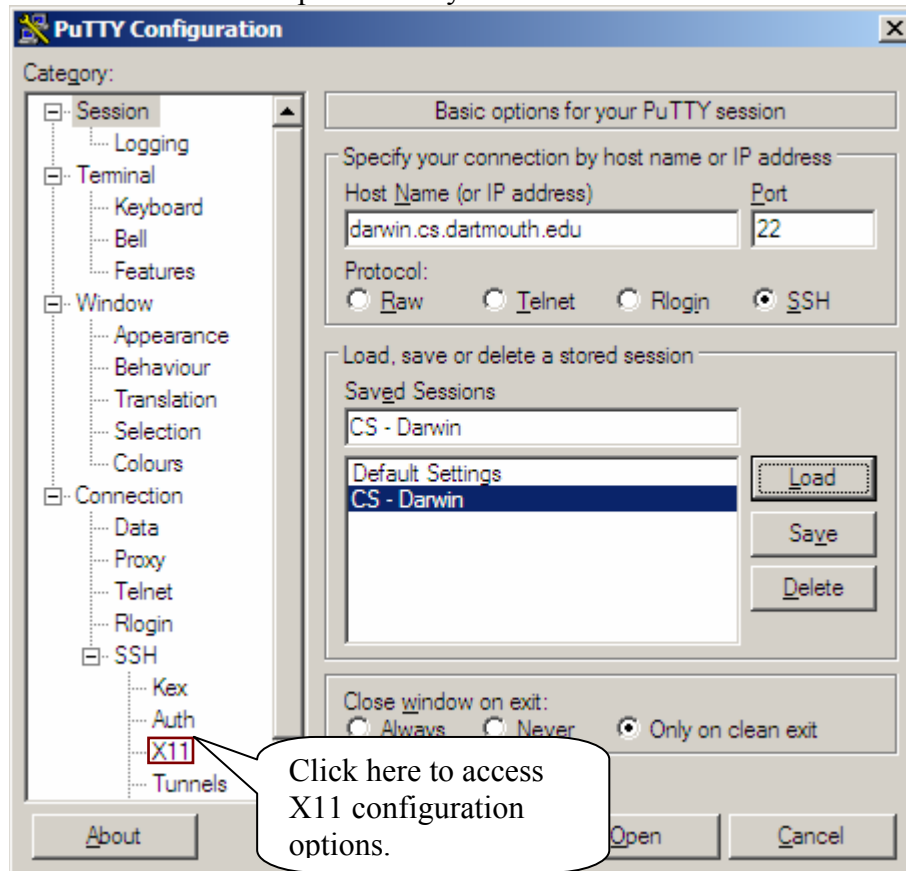
Now, let's configure PuTTY. We want to enable X11 forwarding for our profile, so that we can access graphical applications via SSH.

Start PuTTY. Select the profile you created earlier, and click "Load".
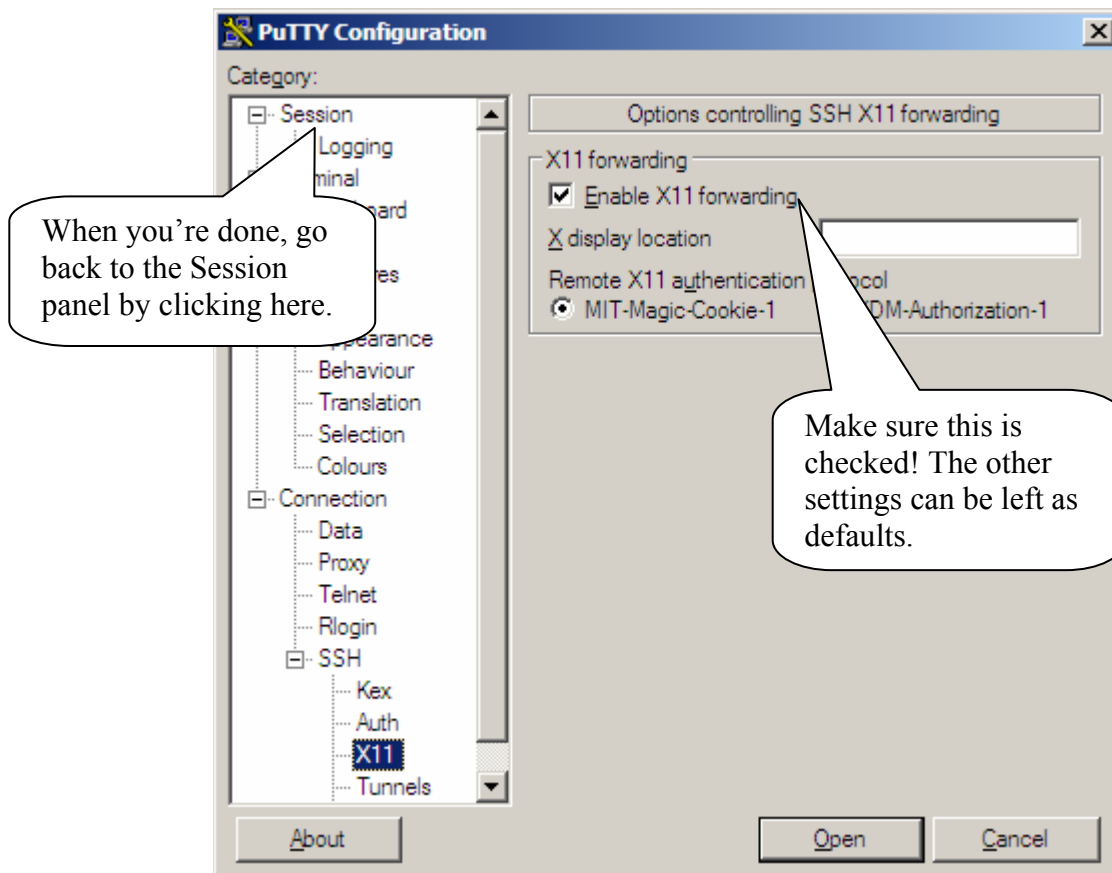

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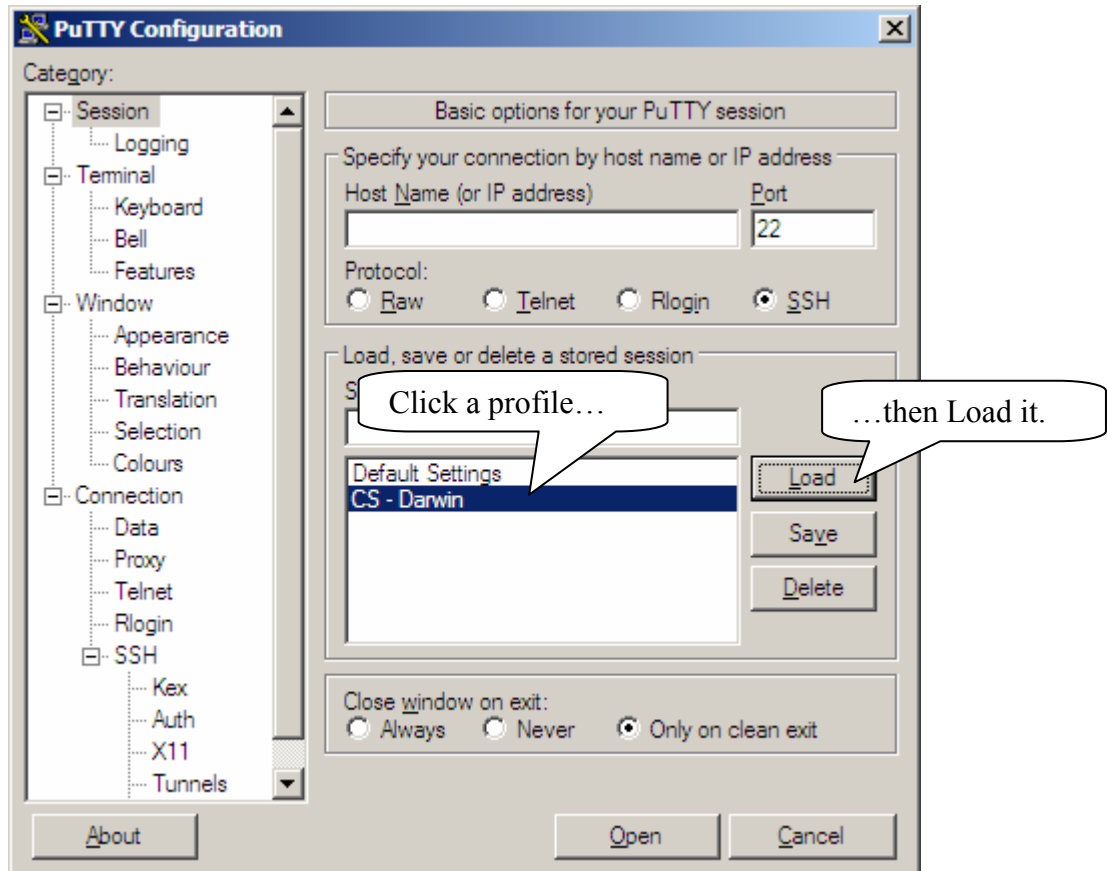
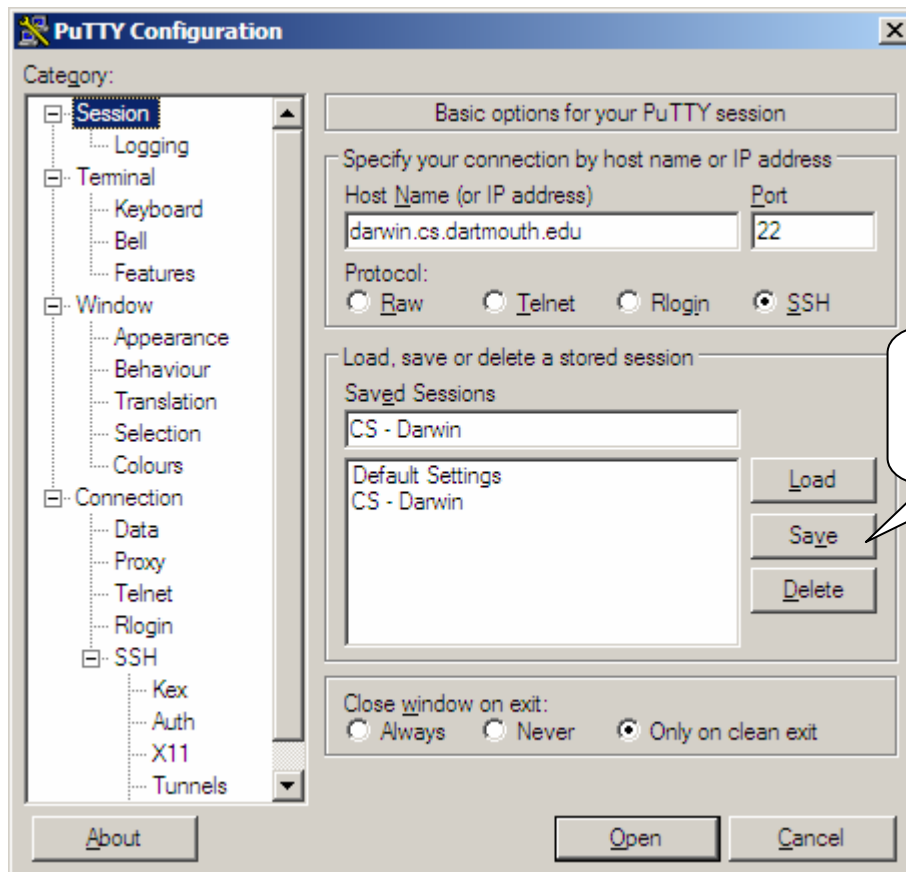You'll notice that PuTTY recalls the parameters you entered earlier.

Now, under SSH in the tree on the left-hand side, click X11.

The following screen appears.

Check the box that says "Enable X11 Forwarding", then go back to the Session panel (click Session at the top of the tree on the left).

Click Save to save your changes.

Click Save.

You've just installed the Cygwin X-Server, configured it, and configured PuTTY for X forwarding!

Tip:	Would you like X11 forwarding to be enabled automatically for new session profiles? Load the "Default Settings" profile, and enable X11 forwarding in the same way! Save the profile, and from now on, every session profile you create will have X11 forwarding enabled automatically!

Using Cygwin and PuTTY Together:

Before you start PuTTY, start the X-Server by double-clicking it's icon on the desktop.
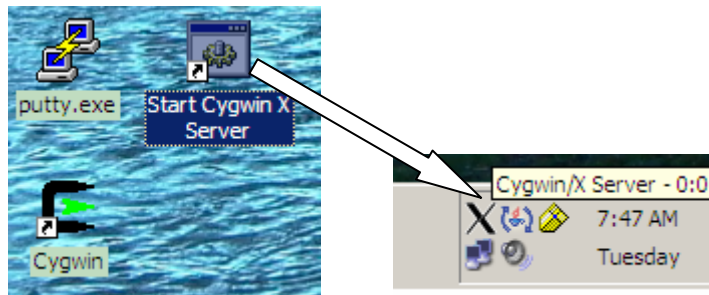

Now you can start PuTTY, and connect to a host.

Double-click a profile to connect to it.
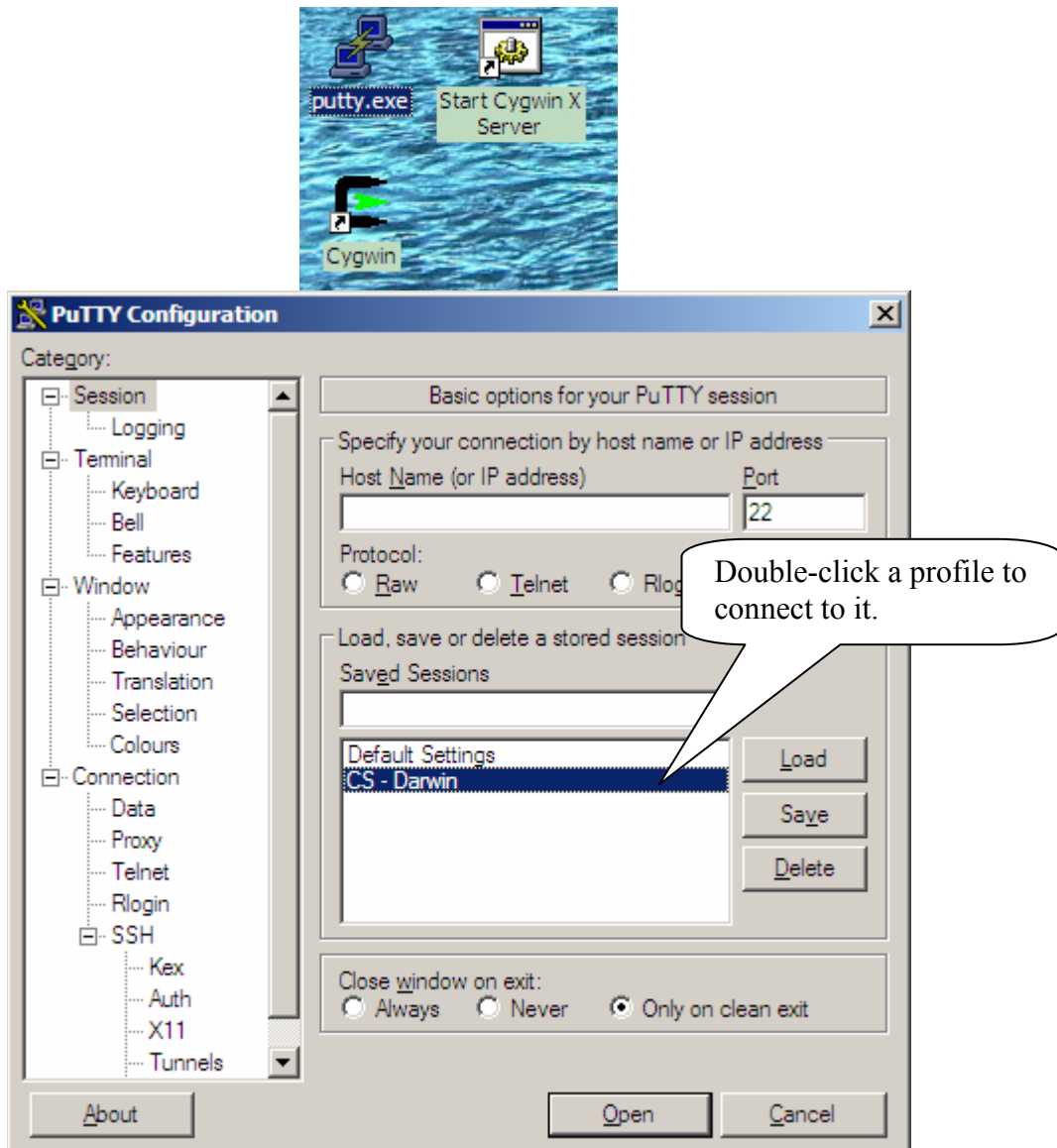
Once you're connected to a host, you can now start graphical applications!

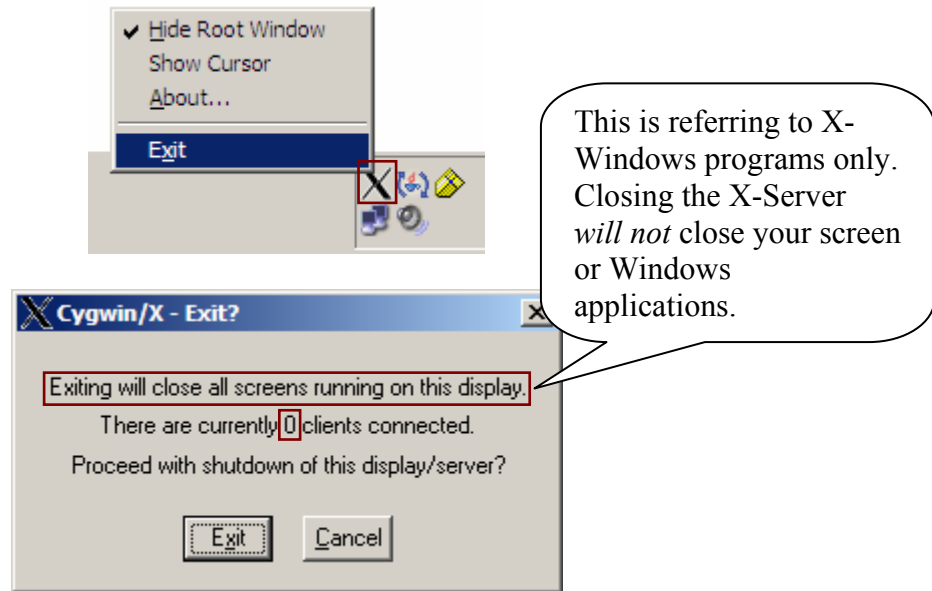|	
Tip:	As you know, when you start an application from the text console, it seizes control of it, and it doesn't return control to the shell until it's done. The same is true for graphical applications — the difference is that they are only "done" when they have exited and their window is closed. Naturally, we want to use multiple graphical applications at the same time, plus have the SSH console available for quick jobs. The way we do this is we start the graphical application in the "background" by adding the ampersand (&) to the end of the command line. For instance, to start Firefox, one would type: `firefox &` Even though we are starting the application in the "background", we're really just starting it as another process. Its window appears on our screen, and we can then use Firefox at the same time as other applications.
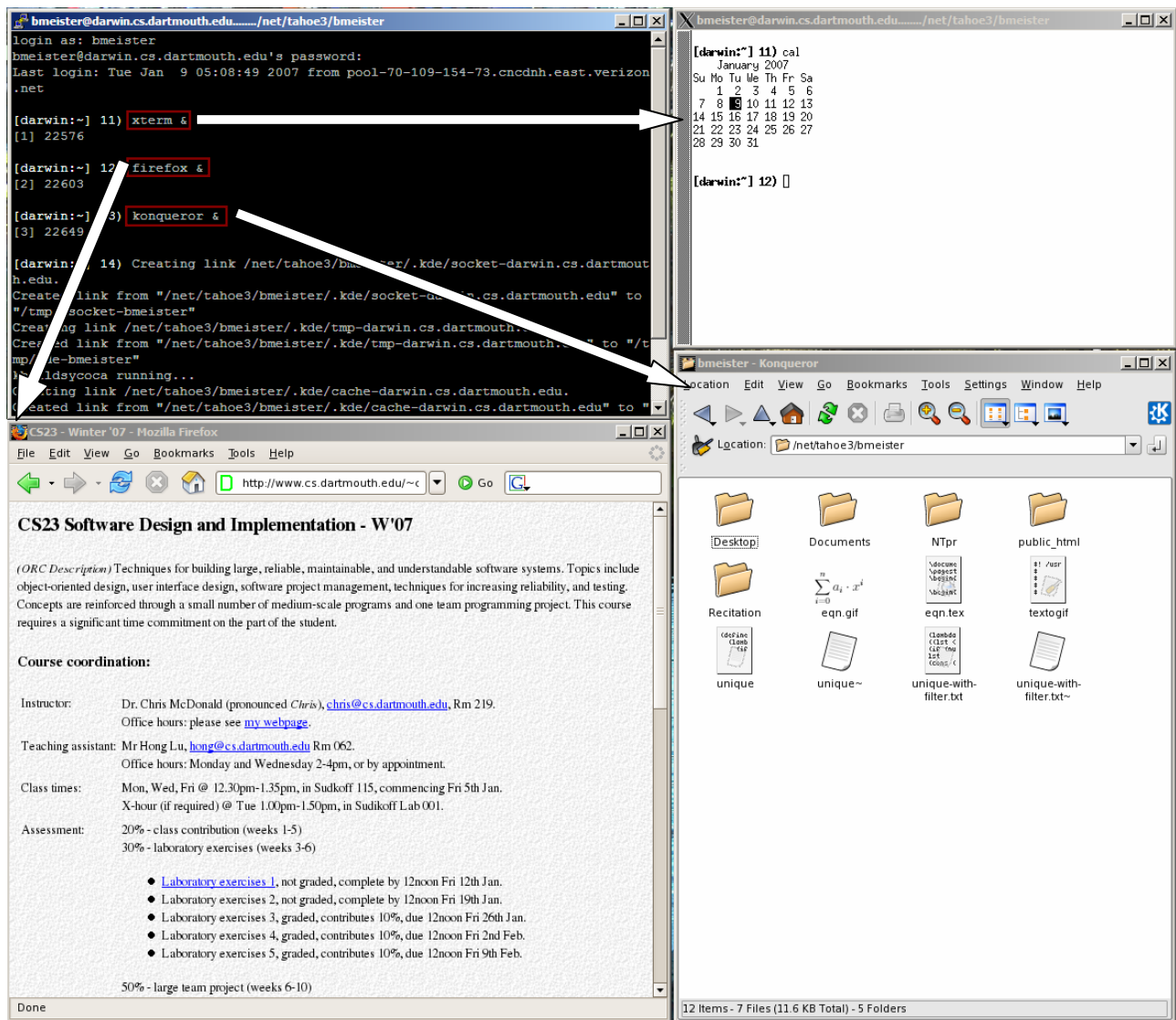
Tip:	Running X applications over the network is quite bandwidth-intensive. If you are off campus or running highly-graphical applications, it may take a few moments for the screen to refresh.

When you're finished using PuTTY and any other X-Windows applications, you can close the X-Server by right-clicking its tray icon and clicking Exit.

This is referring to X-Windows programs only. Closing the X-Server *will not* close your screen or Windows applications.

This dialog says there are 0 clients connected (which means that no programs are using the X-Server at the moment). Thus, it is safe to close the X-Server. If it were to say that there are clients connected, that would mean that an X-Windows application is still running, and that the X-Server should not be closed until these applications are closed (perhaps you have an application minimized in the taskbar).

The End