To use the HPC clusters from a Windows laptop or workstation, the minimum you need is an SSH client to connect with. Setting up your workstation for SSH tunneling will make logging in and transferring files significantly easier, and installing and running an X server will allow you to use graphical software on the HPC clusters.

Instructions for setting all this up can be found on the HPC Wiki. The important parts for this tutorial are outline below: Preparing your Windows workstation for X and Setting up SSH Tunneling.

If you are using a Mac, or Linux, you should follow this page of the tutorial instead.

Preparing your Windows workstation for X

If you wish to use any software with a graphical interface, you will need an X server. This is a software package that draws on your local screen windows created on a remote computer (such as an NYU HPC cluster). There are a couple of options out there:

- We recommend Cygwin/X. Instructions for downloading and installing it can be found here. Before starting PuTTY you will need to have the X server running, by double-clicking the "XWin Server" shortcut under Cygwin-X on the Start Menu. You may wish to add this to your Windows Startup folder so it runs automatically after starting Windows.
- Another good option is Xming. Installation instructions can be found on its web site. As per Cygwin/X, you will need to launch Xming before starting PuTTY.

You will also need to download and install PuTTY SSH if you have not already.

Setting up SSH Tunneling

In computer networking, a computer decides what to do with an incoming network packet according to the "port" it arrived on. The port is simply a number attached to the packet. Certain ports are reserved for specific functions, for example packets arriving on port 22 are assumed to be intended for the SSH handler, so the computer passes those packets to SSH to interpret. Other port numbers are available to use for whatever you like, and as long as the same port is not used for different things on the same computer, everything works.

With SSH Tunneling, you will start an SSH session between your workstation and the bastion host hpc.nyu.edu and instruct that session to create a tunnel. Your workstation will make one end of the tunnel, at "localhost, port 8023" ("localhost" is the computer's name for itself, so packets arriving at your workstation port 8023 will be sent into the tunnel). The bastion host will make the other end of the tunnel, at "prince.hpc.nyu.edu, port 22", so anything coming through the tunnel will be forwarded to the normal SSH port (22) of Prince. The fact that your workstation cannot see Prince does not matter, it only needs to see its end of the tunnel.

The following diagram illustrates the process. It looks complex, but only requires 2 steps: the blue text shows what happens when you create the tunnel (step 1) and the green arrows indicate using the tunnel (step 2).
Step 1: Creating the tunnel

1. First open Putty and prepare to log in to hpc.nyu.edu, as you did in Logging in from Windows - primitive way. If you saved your session during that process, you can load it by selecting from the “Saved Sessions” box and hitting “Load”. Don’t hit “Open” yet!

2. Under “Connection” -> “SSH”, just below “X11”, select “Tunnels”

3. Select “Local ports accept connections from other hosts”

4. Write “8023” (the port number) in the “Source port” box, and “prince.hpc.nyu.edu:22” (the machine you wish to tunnel to - 22 is the port that ssh listens on) in the “Destination” box.

5. Click “Add”. You can repeat step 4 with a different port number and a different destination, if you like (for instance, Babar). If you do this you will create multiple tunnels, one to each destination.

6. Before hitting “Open”, go back to the “Sessions” page, give the session a name (“hpctunnel”) and hit “Save”. Then next time you need not do all this again, just load the saved session.

7. Hit “Open” to login in to hpc.nyu.edu and create the tunnel. A terminal window will appear, asking for your login name (NYU NetID) and password (NYU password). Windows may also ask you to allow certain connections through its firewall - this is so you can ssh to port 8023 on your workstation - the entrance to the tunnel.

You can add other NYU hosts to the tunnel by adding a new source port and destination and clicking “Add”. For example, Prince has 4 login hosts, if you specifically need to use number 1, you could add “Source port = 8024” and “Destination = prince1.hpc.nyu.edu:22”, then press “Add”. You would then perform Step 2 (below) twice - once for Prince on port 8023 and once for Prince1 on port 8024.
Using your SSH tunnel

To log in via the tunnel, first the tunnel must be open. If you've just completed Step 1, it will be open and you can jump down to "Step 2: Logging in via your SSH tunnel". If you completed Step 1 yesterday, and now want to re-use the tunnel you created, first start the tunnel:

Starting the tunnel

During a session, **you need only do this once** - as long as the tunnel is open, new connections will go over it.

1. Start Putty.exe (again, if necessary), and load the session you saved in Setting up SSH Tunneling
2. Hit "Open", and log in to the bastion host with your NYU NetID and password. This will create the tunnel.

Step 2: Logging in via your SSH tunnel

1. Start Putty.exe. In the "Host Name" box, write "localhost" and in the "Port" box, write "8023" (or whichever port number you specified when you set up the tunnel in Setting up SSH Tunneling) We use "localhost" because the entrance of the tunnel is actually on this workstation, at port 8023.

2. Go to "Connections" -> "SSH" -> "X11" and check "Enable X11 forwarding".
3. Optionally, give this session a name (in "Saved Sessions") and hit "Save" to save it. Then next time instead of steps 1 and 2 you can simply load this saved session.

4. Hit "Open". You will again get a terminal window asking for your login (NYU NetID) and password (NYU password). You are now logged in to the HPC cluster!