

Using WestGrid from the desktop

Oct 11 2007
on Access Grid



Introduction

- Simon Sharpe, UCIT Client Services
- The best way to contact WestGrid support is to email support@westgrid.ca
- This seminar gives you the basics of UNIX, as it applies to WestGrid
- It is designed for people accustomed to Windows
 - Some tricks and tips for Windows users
- Feel free to interrupt if you have questions
- A great place for a quick start is; http://www.westgrid.ca/support/quickstart/new_users



UNIX History

- Developed at Bell labs 30 years ago
- Started off for scientific and technical computing
- Linux introduced in 91
- Now used on many commercial servers
- Seeing increasing use on the desktop
- Robust, secure
- Versatile, somewhat obscure

Which UNIX?

- WestGrid includes several versions of 32-bit and 64-bit UNIX
- All similar from the user point of view
- Executables are not transportable, source is
- Storage Facility
 - gridstore.westgrid.ca
- Shared memory machines
 - nexus.westgrid.ca
 - cortex.westgrid.ca
- Cluster machines;
 - glacier.westgrid.ca
 - robson.westgrid.ca
- Cluster with fast interconnect
 - lattice.westgrid.ca
 - Matrix.westgrid.ca
 - tanatalus.westgrid.ca
- Visualization machines
 - hydra.westgrid.ca
- http://www.westgrid.ca/resources_services/compute_facilities



Which Computers

- Kinds of computers
 - Shared memory machines
 - Clusters
 - Mass storage
- Head node/compute nodes
 - Head node
 - interactive
 - limited uses
 - Short test jobs
 - Compute nodes
 - Controlled by scheduler
 - No interactive logins

Logging On

- Back to the Command Line (for now)
- Die-hard UNIX users call the Window Icon Menu Pointer interface the WIMP interface.
- No Telnet or FTP at WestGrid, for security reason
- SSH for logins or SCP for file copies
- What you need to log on
 - Account and password
 - More about accounts at <http://www.westgrid.ca/support/accounts>
 - Machine name
 - Internet connection
 - Secure Shell client



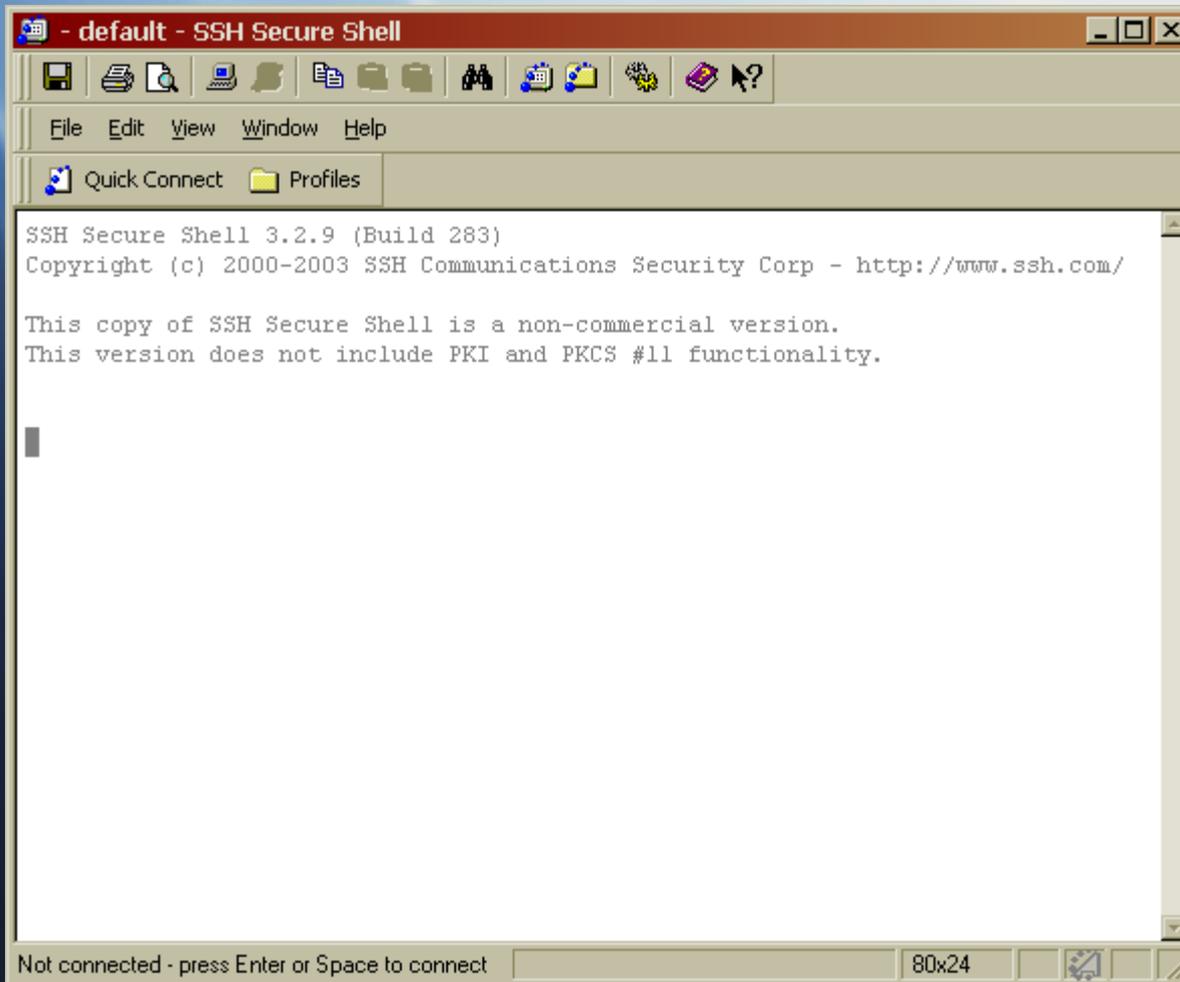
Logging On

- You can connect from Windows, Mac, Linux, or UNIX using Secure Shell protocol
 - The first time you connect from your machine, you will be prompted for the exchange of host keys. You must reply Yes.
- Mac and Linux come with ssh, on Windows you need to obtain/install it

Secure Shell for Windows

- There are various terminal programs that support the ssh protocol available for Windows. http://en.wikipedia.org/wiki/Comparison_of_SSH_clients
- This demo uses a commercial client (SSH) downloaded from
 - <ftp://ftp.ssh.com/pub/ssh/SSHSecureShellClient-3.2.9.exe>
- Instructions on setting it up are at;
 - <http://hpc.ucalgary.ca/westgrid/ssh2.html>
- SSH has some advantages for people who are not at home in a Unix command line environment
- A good, free ssh client is PuTTY, available from; <http://www.chiark.greenend.org.uk/~sgtatham/putty/>

Connecting from Windows Using SSH



Launch SSH client
from Window: 

Click 



Connecting from Windows Using SSH



Connect to Remote Host

Host Name:

User Name:

Port Number:

Authentication Method:

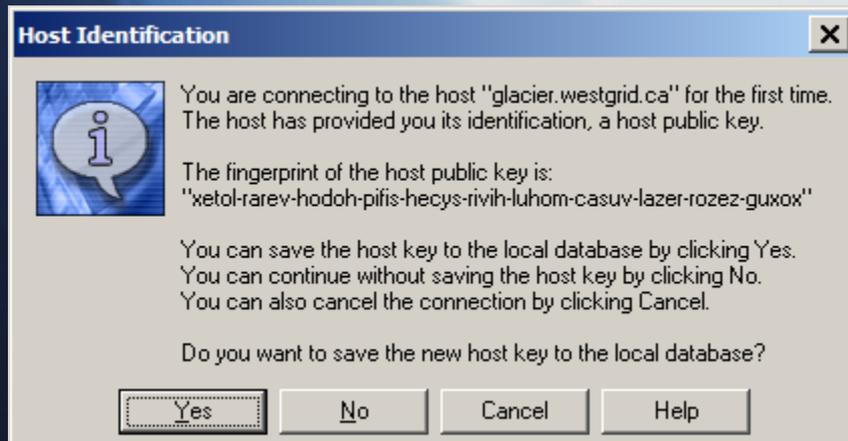
Enter name of target machine and WestGrid userid, Click Connect



Enter Password

Password:

Enter WestGrid Password (same at all sites)



Host Identification

You are connecting to the host "glacier.westgrid.ca" for the first time. The host has provided you its identification, a host public key.

The fingerprint of the host public key is:
"xetol-rarev-hodoh-pifis-hecys-rivih-luhom-casuv-lazer-rozez-guxox"

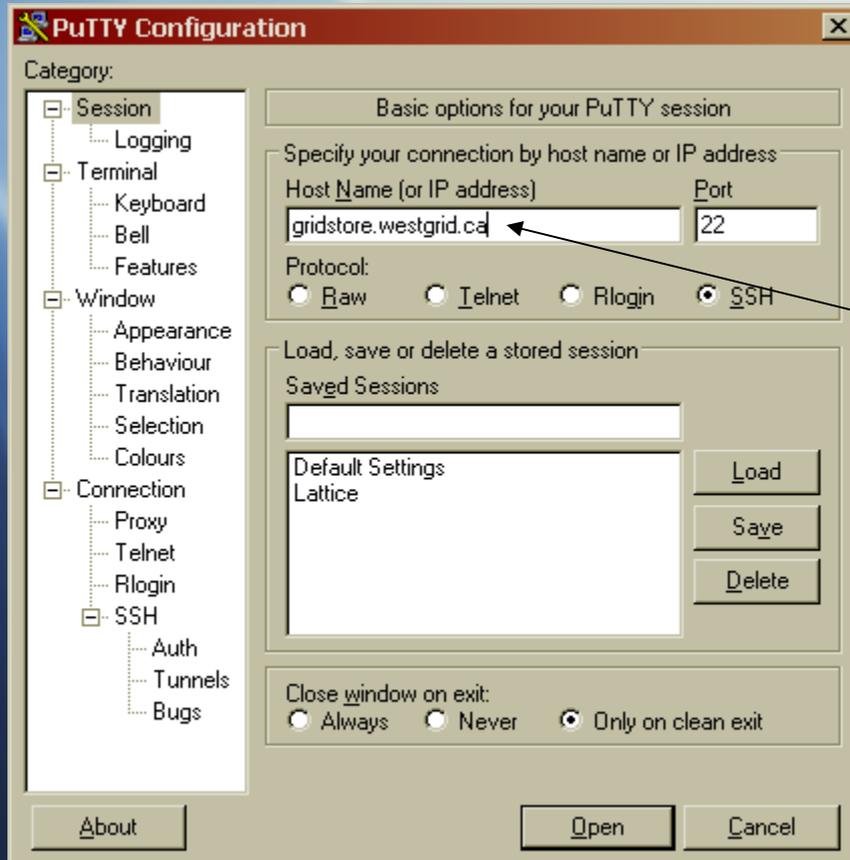
You can save the host key to the local database by clicking Yes.
You can continue without saving the host key by clicking No.
You can also cancel the connection by clicking Cancel.

Do you want to save the new host key to the local database?

This Prompt only appears the first time you connect your computer to this WestGrid machine. Click Yes.



Connecting from Windows using PuTTY



Launch PuTTY



Supply machine name you are connecting to

Click , then Yes on the host key security alert

Connecting from Windows using PuTTY



```
gridstore.westgrid.ca - PuTTY
login as: ssharpe
ssharpe@gridstore.westgrid.ca's password:
Last login: Tue Jun 28 07:36:53 PDT 2005 on ssh from pc18.mcgm
Welcome to gridstore.westgrid.ca, the WestGrid network storage
Please report problems to support@westgrid.ca
ssharpe@gridstore:~> █
```

Logged on to gridstore
through Windows
PuTTY ssh client



Connecting From Linux

- Open a terminal window
 - From Linux, right click on desktop, click terminal
- Assuming your userID is the same on your local machine and the remote machine
 - `ssh -X lattice.westgrid.ca` **or**
 - `ssh -Y lattice.westgrid.ca`

RSA key fingerprint is 0a:a7:d0:07:2f:7c:41:a6:48:6d:92:c8:81:37:1b:0b.
Are you sure you want to continue connecting (yes/no) **Yes**
- What if my userID is different on the remote and local machines?
 - `ssh -l username -X lattice.westgrid.ca`

Connecting From Mac

- To use mouse/menus, you must have X11 installed on your Mac. It comes with the OS, but is not, by default, installed.
- Open an X11 terminal window
- Assuming same userIDs on both machines, use command
 - `ssh -Y lattice.westgrid.ca`
RSA key fingerprint is 0a:a7:d0:07:2f:7c:41:a6:48:6d:92:c8:81:37:1b:0b.
Are you sure you want to continue connecting (yes/no) Yes
- What if my userid is different on the remote and local machines?
 - `ssh -l username -y lattice.westgrid.ca`



Basic UNIX Commands

- Case matters
 - LS not equal to ls
- Commonly used commands
 - pwd Print working directory
 - ls List files in current directory
 - more Show contents of file
 - rm Remove file
 - mkdir Make new directory
 - cd Change directory
 - exit Log me off

UNIX Shells

- A shell is a program running on UNIX that interprets the commands you type
- The WestGrid account application offers a choice of two shells;
 - bash the default shell
 - tcsh extended version of C Shell
- This seminar assumes you accepted the default, bash shell

UNIX Command Options

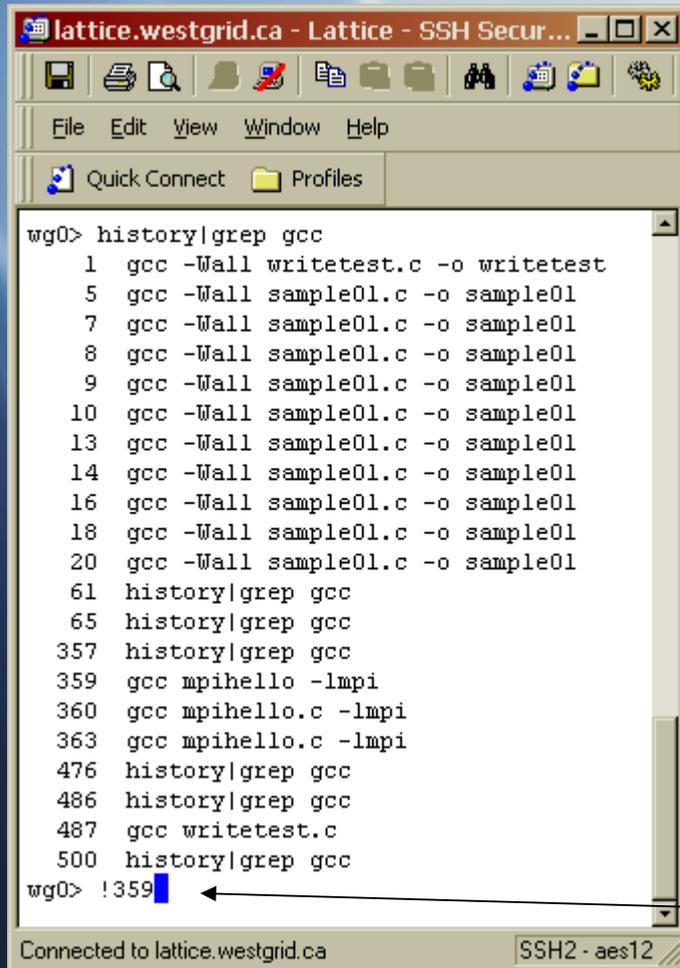
```
glacier.westgrid.ca - glacier - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles
*****
CURRENT NOTICES:
*****
[sshharpe@nunatak1 sshharpe]# ls
[sshharpe@nunatak1 sshharpe]# ls -la
total 152
drwx-----  4 ssharpe  ssharpe    8192 Apr 19 13:38 .
drwxr-xr-x  922 root    root      32768 Sep 23 14:23 ..
-rw-----  1 ssharpe  ssharpe    374 Sep 13 12:32 .bash_history
-rw-r--r--  1 ssharpe  ssharpe    96 Mar  4 2004 .bash_logout
-rw-r--r--  1 ssharpe  ssharpe  1364 Mar  4 2004 .bash_profile
-rw-r--r--  1 ssharpe  ssharpe    502 Mar  4 2004 .bashrc
-rw-r--r--  1 ssharpe  ssharpe   652 Mar  4 2004 .cshrc
-rw-r--r--  1 ssharpe  ssharpe   854 Mar  4 2004 .emacs
drwx-----  2 ssharpe  ssharpe   8192 Mar  4 2004 .globus
-rw-r--r--  1 ssharpe  ssharpe   120 Mar  4 2004 .gtkrc
-rw-----  1 ssharpe  ssharpe     0 Mar  8 2004 .history
drwxr-xr-x  3 ssharpe  ssharpe   8192 Mar  4 2004 .kde
-rw-r--r--  1 ssharpe  ssharpe  1570 Mar  4 2004 .login
-rw-r--r--  1 ssharpe  ssharpe   246 Mar  4 2004 .logout
-rw-r--r--  1 ssharpe  ssharpe  1364 Mar  4 2004 .profile
-rw-----  1 ssharpe  ssharpe   396 Apr 19 13:38 .Xauthority
-rw-r--r--  1 ssharpe  ssharpe   220 Mar  4 2004 .zshrc
[sshharpe@nunatak1 sshharpe]#
```

- Most commands have many options
- `ls -la` List all files, long format
- File names starting in dot are normally hidden
- Permissions are; Read, Write, eXecute
- Columns are owner, group, and all

UNIX Command Help

- `help` Show UNIX commands
- `man ls` Show the manual for the `ls` command
 - `q` Quits from manual
- Command history (bash shell)
 - Cursor up scrolls through previous commands
 - “`history`” shows list of command history
 - Useful to go back and see exactly what you did
 - `! NNN` re-issues command number `NNN`

More Commands



The screenshot shows a terminal window titled "lattice.westgrid.ca - Lattice - SSH Secur...". The terminal content is as follows:

```
wg0> history|grep gcc
 1 gcc -Wall writetest.c -o writetest
 5 gcc -Wall sample01.c -o sample01
 7 gcc -Wall sample01.c -o sample01
 8 gcc -Wall sample01.c -o sample01
 9 gcc -Wall sample01.c -o sample01
10 gcc -Wall sample01.c -o sample01
13 gcc -Wall sample01.c -o sample01
14 gcc -Wall sample01.c -o sample01
16 gcc -Wall sample01.c -o sample01
18 gcc -Wall sample01.c -o sample01
20 gcc -Wall sample01.c -o sample01
61 history|grep gcc
65 history|grep gcc
357 history|grep gcc
359 gcc mpihello -lmpi
360 gcc mpihello.c -lmpi
363 gcc mpihello.c -lmpi
476 history|grep gcc
486 history|grep gcc
487 gcc writetest.c
500 history|grep gcc

wg0> !359
```

At the bottom of the terminal, it says "Connected to lattice.westgrid.ca" and "SSH2 - aes12".

- `grep` Get Regular Expression. Finds word in a stream of text
- `|` Pipe text from one command to the next. This symbol is normally a shifted “\” key
- Example: What compile command did I use last week?
 - `history|grep gcc`
- The displayed command pipes the output of the “history” command into the “grep,” command, showing only lines containing “gcc”
- This command repeats command 359

File Locations

- Slash “/” means the root directory
- Tilde “~” means your home directory
 - Limited space (5 gig on Lattice)
- Dot “.” means right here, current directory
- Dot Dot “..” means up one level
- Temporary storage space may be available. On Lattice it is in /scratch
- Files in scratch not backed up, may be deleted if not touched for a while

Environment

- Environment variables provide information for programs.
- PATH tells bash where to search for programs
- Many problems are resolved by checking or changing paths.
- To show your environment variables, type “env”
- By default, the present working directory is not on your path on WestGrid.
- If you want to run a program called “hello” in your current directory, you must type “./hello”
- Sometimes several copies of a program exist
- To find out which copy of a program UNIX is finding and running, you could, for example, type “which grep”

More About Files

- You can change the permissions on a file or directory with the “chmod” command
 - `chmod -R go+rX /usr/ssharp/stats`
 - The “-R” means recursive (include subdirectories)
 - “go” means group and owner
 - “+rX” means add read and execute permission
 - “man chmod” shows the UNIX manual entry for the command

Passwords and Certificates

- Do not use the UNIX passwd command to change your password
 - Your password is connected with your GridCanada certificate
 - If you **need** to change your password, contact support@westgrid.ca and we'll give you a temporary password you can use to reset your password
 - If you have lost your password , contact support@westgrid.ca and we'll give you a temporary password you can use to reset your password
 - You need to renew your WestGrid account yearly
 - You will receive emails starting 60 days beforehand with a link you can use to easily renew



A Safe Place for Files

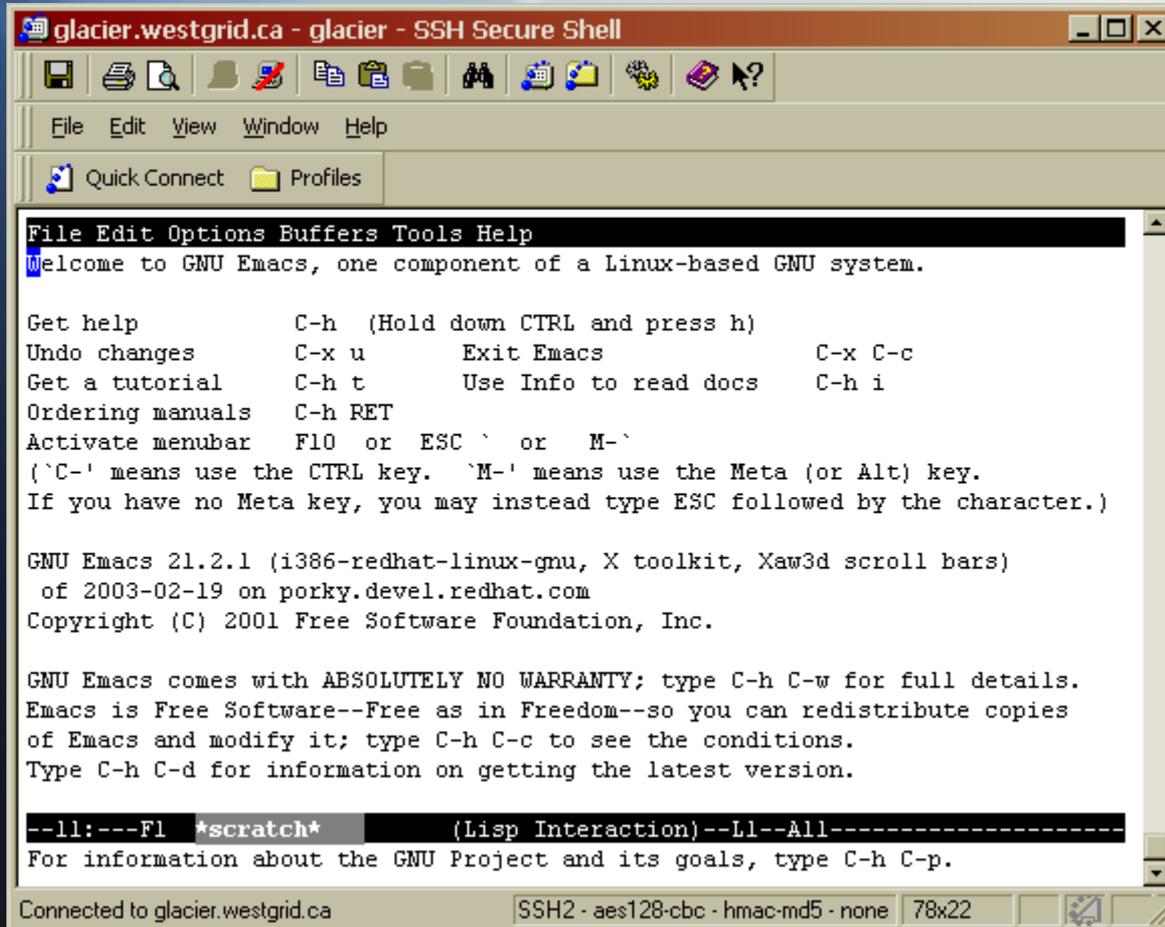
- Though the compute-site user directories are not backed up, SFU (gridstore) is

- “gcp” is a locally-developed scp workalike
- You may be prompted for your grid pass-phrase
- The example copies the “science” directory and contents into my “data” directory on gridstore
- Get help on gcp with `man gcp`

```
lattice.westgrid.ca - PuTTY
wg0> gcp -r science gridstore:data
Your identity: /C=CA/O=Grid/OU=westgrid.ca/CN=Simon Sharpe/Email=ssharp
Enter GRID pass phrase for this identity:
Creating proxy .....
..... Done
Your proxy is valid until: Wed Sep 28 02:27:03 2005
starting transfer of /home/users/ssharp/science/CompressedData.zip ...
starting transfer of /home/users/ssharp/science/Surface.JPG ...
starting transfer of /home/users/ssharp/science/InputData/para1.fit ..
starting transfer of /home/users/ssharp/science/InputData/para2.fit ..
starting transfer of /home/users/ssharp/science/InputData/set1.dat ...
starting transfer of /home/users/ssharp/science/InputData/set2.fmt ...
starting transfer of /home/users/ssharp/science/Output/eigenvalues/val
starting transfer of /home/users/ssharp/science/Output/eigenvalues/val
starting transfer of /home/users/ssharp/science/Output/eigenvalues/val
starting transfer of /home/users/ssharp/science/source/log.txt ...
starting transfer of /home/users/ssharp/science/source/src/bobluator .
starting transfer of /home/users/ssharp/science/source/src/config ...
starting transfer of /home/users/ssharp/science/source/src/discombolul
Transferred 13 files in 7 directories from wg0 to gridstore.
wg0>
```



Editing Files



```
glacier.westgrid.ca - glacier - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles
File Edit Options Buffers Tools Help
Welcome to GNU Emacs, one component of a Linux-based GNU system.

Get help          C-h (Hold down CTRL and press h)
Undo changes      C-x u          Exit Emacs          C-x C-c
Get a tutorial    C-h t          Use Info to read docs C-h i
Ordering manuals C-h RET
Activate menubar  F10 or ESC ` or M-`
(`C-' means use the CTRL key. `M-' means use the Meta (or Alt) key.
If you have no Meta key, you may instead type ESC followed by the character.)

GNU Emacs 21.2.1 (i386-redhat-linux-gnu, X toolkit, Xaw3d scroll bars)
of 2003-02-19 on porky.devel.redhat.com
Copyright (C) 2001 Free Software Foundation, Inc.

GNU Emacs comes with ABSOLUTELY NO WARRANTY; type C-h C-w for full details.
Emacs is Free Software--Free as in Freedom--so you can redistribute copies
of Emacs and modify it; type C-h C-c to see the conditions.
Type C-h C-d for information on getting the latest version.

--ll:---F1 *scratch* (Lisp Interaction)--Ll--All-----
For information about the GNU Project and its goals, type C-h C-p.

Connected to glacier.westgrid.ca SSH2 - aes128-cbc - hmac-md5 - none 78x22
```

- Command-driven editors
- vi –only for the enthusiast
- Emacs –ok, for a text driven editor
- There **is** help, but it still ain't easy
- Can't I just use my mouse?

Editing With Your Mouse

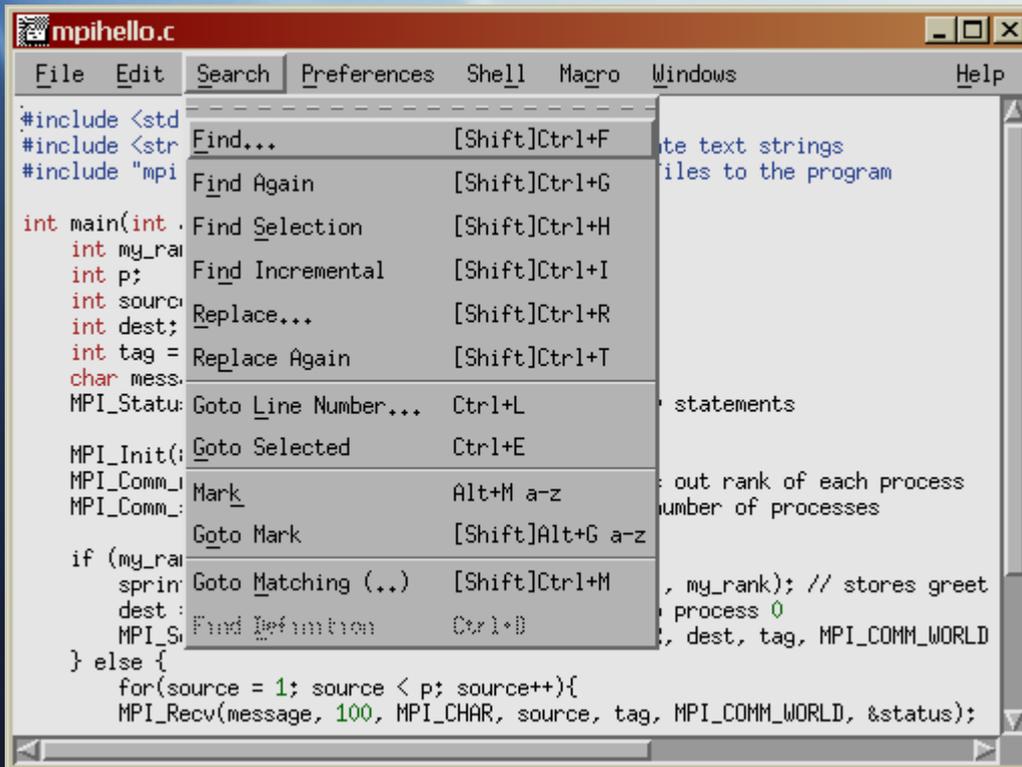
- Nedit is a simple menu-based editor. To use UNIX menus, you need an “X11” graphics display
- With your Linux or Mac, X11 is included
 - you can use your mouse directly on WestGrid graphic display (provided you have enabled ssh tunneling)
- To use your local Microsoft Windows mouse on UNIX, you need an X11 program for Windows.
 - Cygwin/X, Xming, WeirdMind and WeirdX are free.
 - WiredX, Exceed and X-Win32 are commercial.
 - I have used X-Win32 and Xming successfully on WestGrid
- Troubleshooting
 - When I try to open an X11 application, such as xclock or nedit, I get a message “Cannot open display”
 - Is ssh tunneling enabled?
 - Is an X11 client running?
 - Have you restarted SSH



Enabling UNIX Graphics

- Whichever SSH client you use, you will need to enable X11 tunneling to display UNIX graphics locally.
- Using SSH for Windows from Communications Security Corp, follow menupath
 - Edit >> Settings >> Connection >> Tunneling
 - Click the “Tunnel X11 connections” checkbox
- Using PuTTY, select option
 - Communication >> SSH > Tunnels >> EnableX11 Forwarding
- Using ssh from RedHat
 - Use the “-X” option with the ssh connection (or -Y if -X did not work)
- Using ssh from Mac
 - Use the “-Y” option

A More Familiar Interface



The screenshot shows a Notepad++ window titled "mpihello.c" with a menu open over the "Search" tab. The menu items and their keyboard shortcuts are:

Action	Shortcut
Find...	[Shift]Ctrl+F
Find Again	[Shift]Ctrl+G
Find Selection	[Shift]Ctrl+H
Find Incremental	[Shift]Ctrl+I
Replace...	[Shift]Ctrl+R
Replace Again	[Shift]Ctrl+T
Goto Line Number...	Ctrl+L
Goto Selected	Ctrl+E
Mark	Alt+M a-z
Goto Mark	[Shift]Alt+G a-z
Goto Matching (..)	[Shift]Ctrl+M
Find Definition	Ctrl+D

The background code in the editor includes headers for `<stdio.h>`, `<string.h>`, and `"mpi.h"`, and a `main` function that uses `MPI_Init`, `MPI_Comm_spawn`, `MPI_Send`, and `MPI_Recv`.

- Log on to WestGrid with SSH
- For Windows, start your X11 service (Xming or X-Win-32) so you see an X on your taskbar

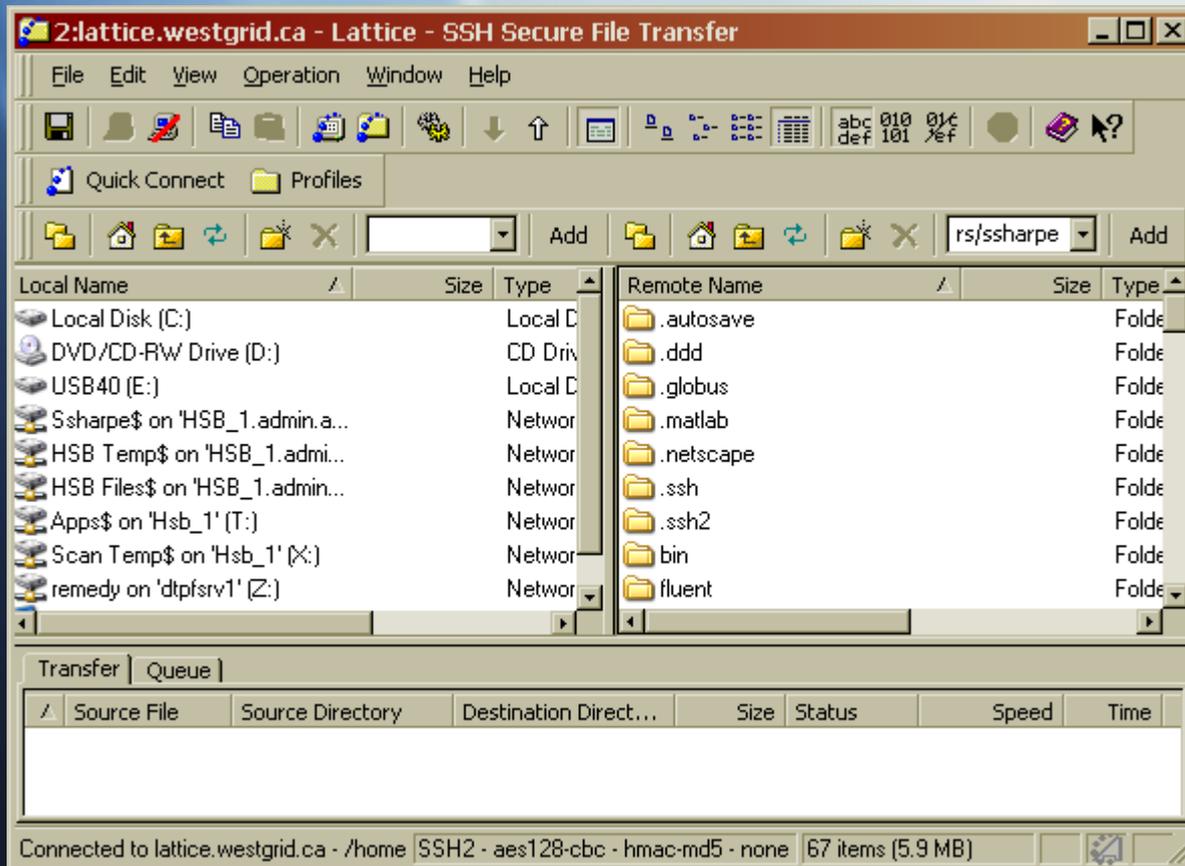


- In SSH type “nedit”
- Add an & to the command to leave your ssh window useable

File Transfer with MS Windows

- MS Windows marks the end of each text line with two characters, a CR (Carriage Return) and LF (Line Feed)
- UNIX marks the end of each text line with only an LF
- If you transfer a text file between UNIX and Windows, use an ASCII transfer method
- If you are transferring a binary or compressed file, use a binary transfer method

Browsing UNIX from Windows using SSH



- Log on to UNIX through SSH
- Click  (Open file transfer window)
- Browse, view or move files between systems
- If transferring files, use menu Operation >> File Transfer Mode

Other Tutorials

- Many UNIX tutorials are available on the web
- Try Googling
 - UNIX Tutorial or
 - UNIX Primer
- An excellent tutorial is currently available at
 - <http://www.ee.surrey.ac.uk/Teaching/Unix/>
- Not all features are available on all UNIXes
 - Things can look quite different depending on which shell you are using
 - Unless you have a compelling reason to do otherwise, you might want to keep the default shell, bash.

Summary

- To access WestGrid from Windows
 - Install Xming and start it running
 - Install PuTTY (or SSH), enable X11 tunneling
 - Connect through PuTTY (or SSH)
- To access WestGrid from RedHat
 - Use ssh with “-X” (or possibly “-Y”)
- Using ssh from Mac
 - Install X11
 - Use ssh with “-Y”
- Getting help
 - Type “help” for command list
 - Type “man command” for help on command
 - Support pages at <http://www.westgrid.ca/support/>
 - Email support@westgrid.ca

