# C++ Programming on Linux

#### CS 2308 Spring 2015

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#### Using Linux

- Common user interfaces:
  - \* Command line (\$ prompt)
    - User enters commands at the prompt
    - · results displayed on following lines
    - · often referred to as a "shell"
    - Demo: terminal app in Mac OSX
  - \* graphical interface: X Window System
    - Similar to MS Windows or Mac OS X
    - KDE: K Desktop Environment (used in our linux lab)

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#### What is Linux?

- an operating system
- Unix-like
- Open source
- created in 1992 by Linus Torvolds
- can be installed on a wide variety of hardware
  - mobile phones
  - · desktop/laptop computers (PCs)
  - mainframes
  - supercomputers

#### Accessing Linux at Texas State

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- Derr 231: Texas State CS Dept Linux Lab
- Requires a CS Dept Linux account
  - \* use your netID and password
  - http://cs.txstate.edu/labs/Linux/Accounts.php
- The lab machines start up in KDE (windows).
- To open a terminal window :
  - \* Click on the kaleidoscope, select: System Tools > Terminal
- You can also log in remotely from MCS590 or your own computer (windows/mac/linux/etc.)

#### Linux File System

- Common hierarchical system.
- Root directory of the system: /
- Directories can contain:
  - \* Files
  - \* Other Directories
- Each user has a home directory:
  - \* /home/Students/js108

# **Basic Shell Commands**

- To display the manual page for a linux command
- To display a list of options that work with the command:
  - [...]\$<command-name> --help
- To clear the screen

[...]\$clear

#### **Basic Shell Commands**

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• To display the current (working) directory

[...]\$pwd /home/Students/js108

To display a listing of the contents of the current directory

[...]\$**ls** 

• To see more info about the files in the directory

[...]\$**ls** -1

#### **Basic Shell Commands**

- To display all the files, including the hidden ones
   [...]\$1s -a
- To display a listing of the contents of some other directory
  - [...]\$ls /etc
- To change the current (working) directory

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[...]$cd /etc
```

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# Basic Shell Commands To create a new directory (in the current one) [...]\$mkdir projects To remove a directory (must be empty) [...]\$rmdir projects Some shortcuts ~ is your home directory ...is the parent directory [...]\$cd ~/projects

\* . is the current directory

#### **Basic File Editing**

 To use the nano editor to create a file and start editing it:

[...]\$nano myFile.txt

- This begins an editor within the terminal window.
- You can type to enter text, navigate with the arrow keys, use the backspace/delete keys.
- Other commands, listed at bottom of window, are activated with the control key and a letter.

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#### **Basic File Editing**

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- When finished, press CTRL-X
- Follow the prompt: press Y to save
- You may also use other editors:

\* vim

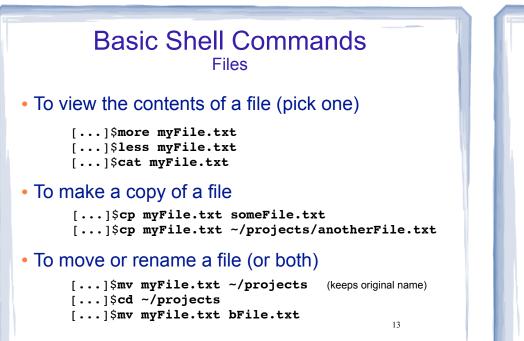
\* emacs

• All of these editors run from within the terminal window.

More Editing Options

- There is also a text editor in KDE (the graphical interface)
- Find it in the menu system
- Files you create and save in the KDE text editor are stored to your linux home directory and can be accessed using the shell commands.

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### Compiling and Running C++ Programs

- Create a file containing a C++ program.
  - [...]\$nano hello.cpp
- To compile the file using the gnu compiler:
  - [...]\$g++ hello.cpp

(if you get compiler errors, fix in editor, run g++ again)

• To run the executable file:

[...]\$./a.out

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#### Basic Shell Commands Files

• To delete (remove) a file

[...]\$rm myFile.txt
[...]\$rm \*.txt

• The file is gone, there is no trash can.

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#### Using Unix on a Mac

- Mac OS X is built on top of Unix (no need to log in to another computer).
- Use the Terminal app to run the shell commands.
- Use the TextEdit app to edit programs/files.
- You can use g++ or clang++ (more up to date) to compile c++ files.

Note: to get g++ and clang++ for Mac OSX you should install XCode, then command line tools (XCode preferences)

#### Remote Access from MS Windows

- Two options:
  - \* secure shell client
  - putty
- These both allow you to remotely log-in to unix/linux machines and enter shell commands.
- Download either from the CS departmental download server
   <u>http://downloads.cs.txstate.edu</u>
- Select os then windows then remote\_access, then secure shell client OR putty
- Install on your machine
- Or go to <u>putty.org</u> to find putty

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#### Secure Shell and Putty

- Secure Shell:
  - \* To run: double click on Secure Shell Client icon
  - \* Click Quick Connect and enter a host machine:

#### hercules.cs.txstate.edu

- Enter username and password.
- Putty
  - \* To run: All Programs > SSH > PuTTy
  - \* Enter a host machine in the Host Name field (see above for names) then click Open
- \* Click Yes if you get an alert
- \* Enter username and password.

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## Secure File Transfer from Windows PC

- Secure Shell: If you are currently connected and would like to transfer files with Secure FTP:
  - \* click the Windows menu,
  - \* then New File Transfer
- Filezilla, a free app for transferring files and runs on windows or mac. <u>http://filezilla-project.org</u>
  - \* select View menu, check Quickconnect bar
  - \* fill in host: sftp://hercules.cs.txstate.edu
  - \* fill in username, password then click Quickconnect
- \* then drag and drop files to copy between machines

# Remote Access

• The ssh command (secure shell) allows you to securely connect to a remote computer within a shell.

[...]\$ssh js108@hercules.cs.txstate.edu (You will be asked to enter your password)

- Current directory will be your home directory
- Can use all the standard linux commands
- Type exit to logout of the secure shell session

[...]\$**exit** 

#### Secure File Transfer from unix/linux shell

• Secure FTP allows you to securely connect to a remote computer to transfer files.

 $[\ldots]$  \$sftp js108@hercules.cs.txstate.edu

(You will be asked to enter your password)

- 1s will display files on remote machine
- use get to transfer a file to your local machine sftp>get myFile.txt
- Type exit to logout of the secure ftp session sftp>exit 21