

C++ Programming on Linux

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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

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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 lab)

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Accessing Linux at Texas State

- Derr 231: Texas State CS Dept Linux Lab
- Requires a CS Dept Linux account
 - * use your netID and password
 - * <http://cs.txstate.edu/labs/LinuxAccounts.php>
- The lab machines start up in KDE (windows).
- To open a terminal window :
 - * Click on the kaleidoscope, select: System Tools > Terminal

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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

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Basic Shell Commands

- To display the manual page for a linux command

```
[...] $man <command-name>
```

- To display a list of options that work with the command:

```
[...] $<command-name> --help
```

- To clear the screen

```
[...] $clear
```

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Basic Shell Commands

- 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 -l
```

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Basic Shell Commands

- To display all the files, including the hidden ones

```
[...] $ls -a
```

- To display a listing of the contents of some other directory

```
[...] $ls /etc
```

- To change the current directory

```
[...] $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

- * . is the current directory

```
[...]$cd ~/projects
```

```
[...]$cd ..
```

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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

- 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.

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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.
- On Mac OSX you could use TextEdit

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Basic Shell Commands

Files

- To view the contents of a file (pick one)

```
[...]$more myFile.txt  
[...]$less myFile.txt  
[...]$cat myFile.txt
```

- To make a copy of a file

```
[...]$cp myFile.txt someFile.txt  
[...]$cp myFile.txt ~/projects/anotherFile.txt
```

- To move or rename a file (or both)

```
[...]$mv myFile.txt ~/projects (keeps original name)  
[...]$cd ~/projects  
[...]$mv myFile.txt bFile.txt
```

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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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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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Note: to get g++ for Mac OSX you should install XCode, then command line tools

Remote Access

from unix/linux shell

- 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
```

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Remote Access

from MS Windows

- Two options:
 - * secure shell client
 - * putty
- Download either from the CS departmental download server
<http://downloads.cs.txstate.edu>
- Select os then windows then remote_access, then secure shell client OR putty
- Install on your machine

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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 unix/linux shell

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

```
[... ]$sftp js108@hercules.cs.txstate.edu
```

(You will be asked to enter your password)

- `ls` 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
```

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Secure FTP 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. <http://filezilla-project.org>
 - * 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

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