

C++ Programming on Linux

CS 2308
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Slides 14-end are for your information only,
you will not be tested over that material.

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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”
 - * graphical interfaces (windows):
 - X Window System (Unix)
 - Mac OS X (Unix)
 - KDE, Unity, GNOME, etc. (Linux)

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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
 - * <https://cs.txstate.edu/resources/labs/accounts/linux/>
- Lab machines start up in a graphical interface.
- To open a terminal window (shell):
 - * KDE: Click on the kaleidoscope, System Tools > Terminal
 - * Others: search for a Terminal app
- You can also log in remotely from MCS590₄ 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

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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 (working) 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.
- When finished, press CTRL-X
- Follow the prompt: press Y to save

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## More Editing Options

- You may also use other editors:
  - \* vim
  - \* emacs
- All of these editors run from within the terminal window.
- There are also text editors in the graphical interfaces.
- Files you create and save in these text editors are stored to your linux home directory and can be accessed using the shell commands.

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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 (changes the name)
```

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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.

- zip: to put files into a zip file

```
[...]$zip myZipFile.zip file1.cpp file2.cpp
```

- sendmail: to email a text file to yourself

```
[...]$sendmail js108@txstate.edu <file1.cpp
```

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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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## Accessing Linux from Your Device

- The remaining slides are for your information only. They are not part of the curriculum.
- The department has provided machines that run Linux in Derrick 231 and you can do all of your programming assignments there.
  - \* Machines in MS590 can be started up in Linux.
- Proceed with caution ...

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## Options for accessing Linux from your device

- MS Windows: remotely log in to the dept. linux machines using Secure Shell or Putty apps.
- Mac: Use the terminal app (it's Unix underneath). you can also log in remotely to the dept machines.
- Windows PC: you can install Linux if you want (proceed at your own risk!!).
  - \* Consider using virtualbox. It allows you to have windows and linux on one machine (see youtube videos).
- Tablets/Mobile phones: there are apps that let you remotely login in to Linux/Unix machines.

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## 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 <http://downloads.cs.txstate.edu>
- Select os then windows then remote\_access, then secure shell client OR putty
- Install on your machine
- Or go to [putty.org](http://putty.org) to find a more recent version of 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.

These are the names of the machines you can log in to:

athena  
zeus  
eros  
hercules

- Putty

- \* To run: All Programs > SSH > PuTTY
- \* Enter a host machine in the Host Name field 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. <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

## 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++ to compile c++ files.

Note: to get g++ and clang++ for Mac OSX you should install XCode, including command line tools.

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## 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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# 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
```

Or just use FileZilla ...