C++ Basics

CMSC 240 Software Systems Development

Today

- First look at the C++ syntax

- Intro to Unix/Linux

- Intro to Version Control

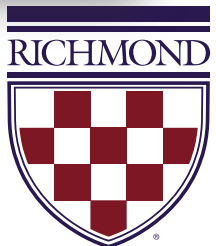- Environment setup

- In-class coding exercise

C++ Language Basics

Input From the Terminal

```cpp
#include <iostream>
using namespace std;

int main()
{
    cout << "Please enter your first name (followed by 'enter'):" << endl;
    string first_name;              // first_name is a variable of type string
    cin >> first_name;              // read characters into first_name
    cout << "Hello, " << first_name << "!" << endl;
}
```

RICHMOND

YOU Kinda Already Know C++

- Conditionals: Use **if** and **else** with the same syntax

```cpp
int random_number = rand();

if (random_number >= 4) // Do something if condition1 is true
{
    cout << "It's greater than or equal to 4" << endl;
}
else if (random_number <= 2) // Do something if condition1 is false and condition2 is true
{
    cout << "It's less than or equal to 2" << endl;
}
else // Do this if both condition1 and condition2 are false
{
    cout << "It has to be 3!" << endl;
}
```
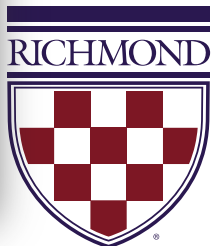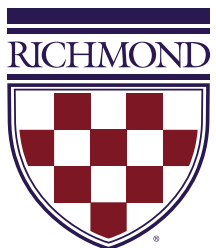
YOU Kinda Already Know C++

- Loops: Use **while** and **for** loops with the same syntax

```cpp
int count_down = 10;
while(count_down > 0)
{
    // Run this as long as the condition is true
    cout << count_down << endl;
    count_down--; // Subtract one from count down
}


//    Initialization  ;   Condition   ; operation run on each iteration
for (int count_up = 1; count_up <= 10; count_up++)
{
    // Run this until the condition is false
    cout << count_up << endl;
}
```
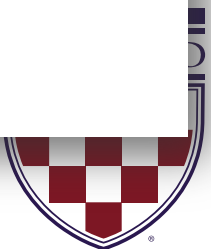
YOU Kinda Already Know C++

- Basic Types: Use **int**, **float**, **double**, **char**
- Variable Declaration: You declare what each variable is

```cpp
short eggs = 12;                      // integer number : 2-bytes
int   number_of_steps = 3000;         // integer number : 4-bytes
long  population = 4000000;            // integer number : 8-bytes
float temperature = 98.5;             // single-precision floating point :  4-bytes
double flying_time = 3.5;             // double-precision floating point :  8-bytes
char the_letter_a = 'a';              // char for individual characters
string name = "Annemarie";            // string for character strings
bool lights_on = true;                // bool for logical variables
```

YOU Kinda Already Know C++

- Functions/Methods: You describe a functions input/output

```cpp
// The square function will input an integer value
// and return the square of that integer value.
int square(int value)
{
    return value * value;
}
```
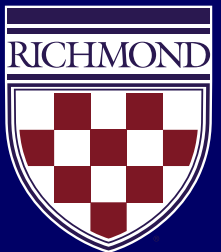
YOU Kinda Already Know C++

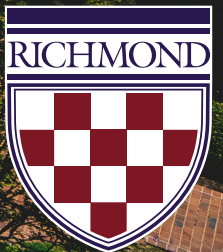- Logical operators: == <= >= < > && || and ! all work the same

```cpp
if(bool1 || bool2)
{
    cout << "bool1 OR bool2 is true." << endl;
}
if(bool1 && bool2)
{
    cout << "bool1 and bool2 is true" << endl;
}
if(bool1 == false)
{
    cout << "bool1 is false" << endl;
}
if(bool2 != true)
{
    cout << "bool2 is not true" << endl;
}
```
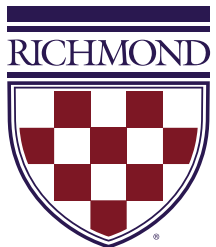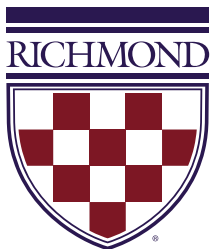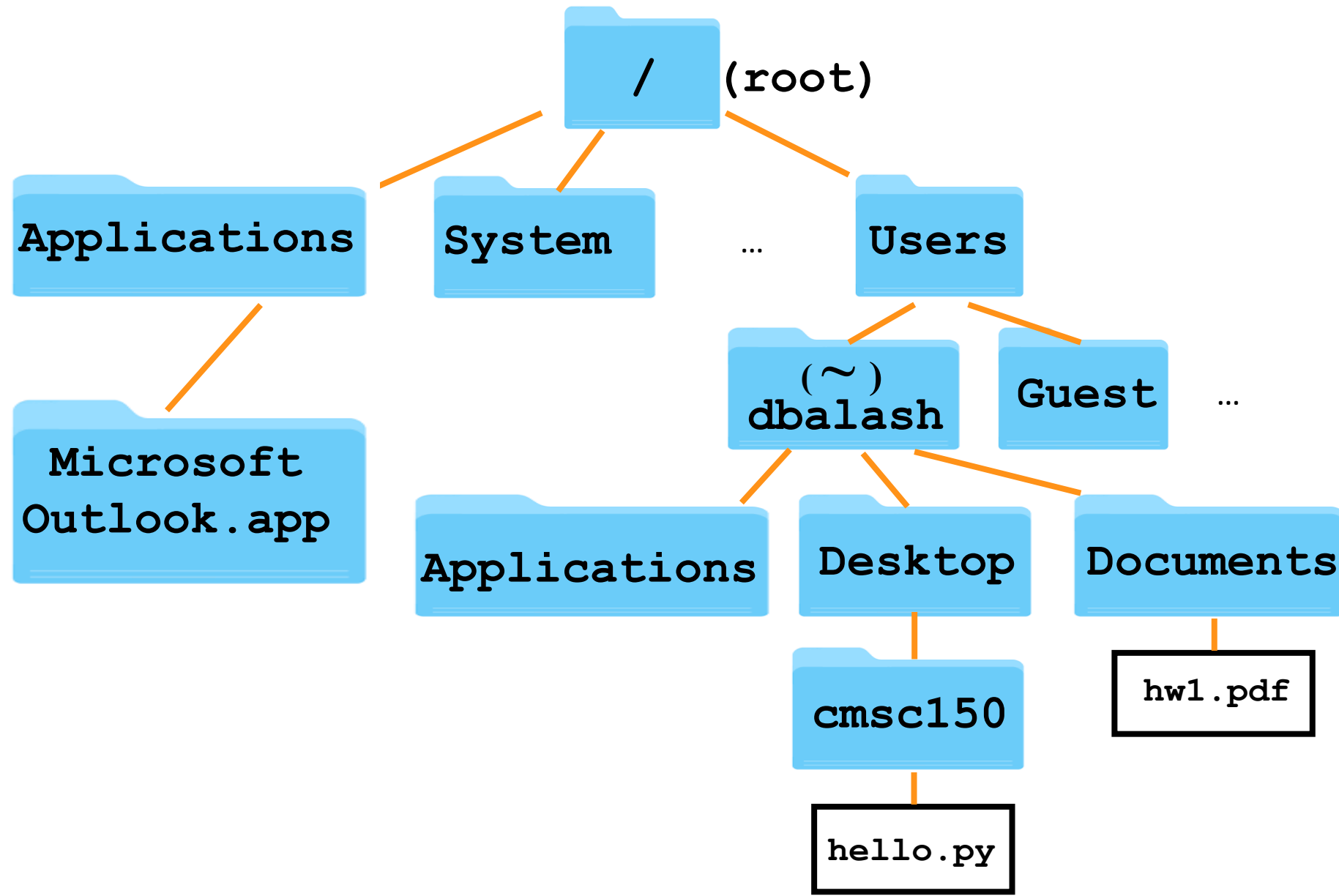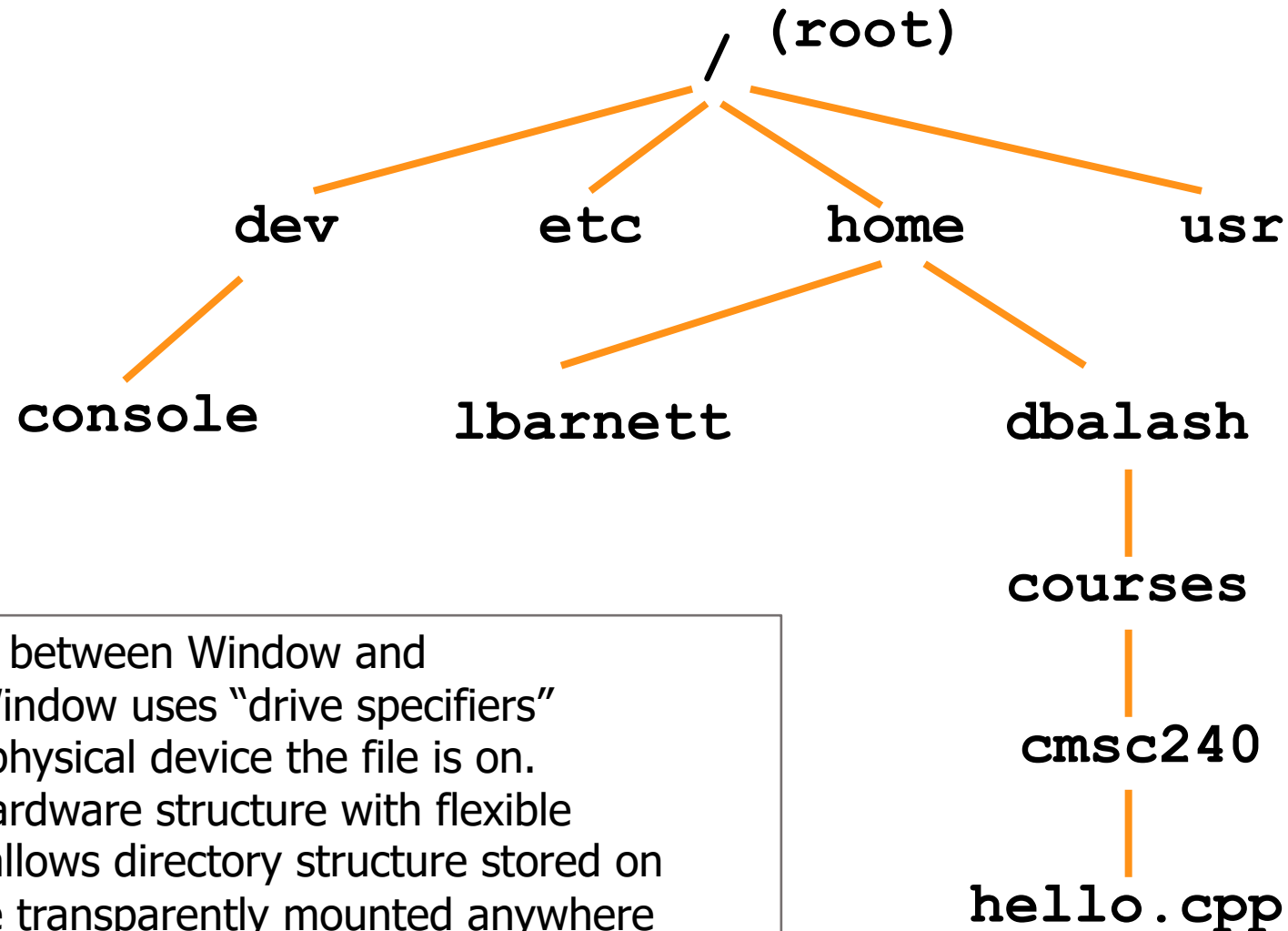
Ask me questions

Intro to Unix

Example Unix File System (on Mac)

Example Unix File System (on Linux)

/ (root)

dev   etc   home   usr

console

lbarnett   dbalash

courses

cmsc240

hello.cpp

Big difference between Window and Unix/Linux: Window uses "drive specifiers" that indicate physical device the file is on. Linux hides hardware structure with flexible scheme that allows directory structure stored on a device to be transparently mounted anywhere in a tree-structured file system.
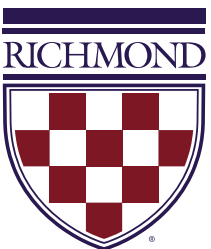
Unix/Linux File System

- Special directory names:
  - Root directory: /
  - Current directory: .
  - Parent directory: .. (allows you to go up)
  - User's home directory: ~
  - Some other user's home: ~sb4tc

- Two primary operations for navigating/locating:
  - `cd <name>` change directory to "name" (relative)
  - `ls`   list all files/directories in current directory
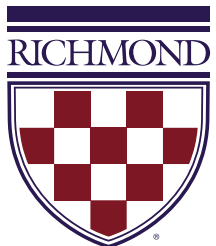
Example Terminal Commands

```
$ cd ~
$ mkdir cmsc240
$ cd cmsc240
$ pwd
$ echo "Hi!" > myFile.txt
$ cat myFile.txt
$ cp myFile.txt yourFile.txt
$ mv yourFile.txt ourFile.txt
$ mkdir tmpDir
$ mv ourFile.txt tmpDir
$ ls
$ cd ..
```

- change to home directory
- make a new cmsc240 directory
- cd to the cmsc240 directory
- print the present working directory
- redirect output to a new file
- display contents of file
- make a copy of the file
- rename the new file
- make another new directory
- move the file copy to new directory
- list current directory contents
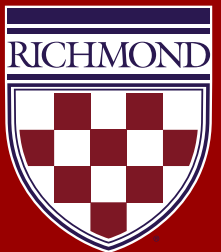- change to parent directory
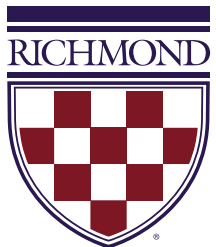
Need Help? Use "man" pages...

```
$ man ls
$ man cd
$ man man
```

- Navigating a manual page:
  - \<return\>   advances line at a time
  - \<space\>   advances page at a time
  - b   goes back one page at a time
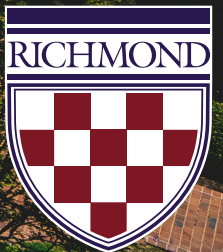 - /keyword   searches for keyword
  - q   quits
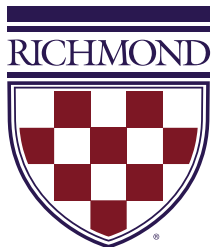
Give it a try!

Intro to Version Control with Git

Environment Setup

In-Class Coding Exercise