



UNIVERSITY OF  
RICHMOND

# C++ Basics

CMSC 240 Software Systems Development

# Today

- First look at the C++ syntax
- Environment setup
- Intro to Unix/Linux
- In-class coding exercise
- Intro to Version Control





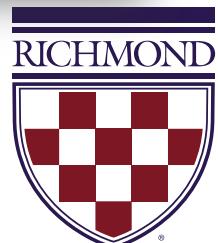
# C++ Language Basics



# Input From the Terminal

```
#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;
}
```



# YOU Kinda Already Know C++

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

```
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;
}
```

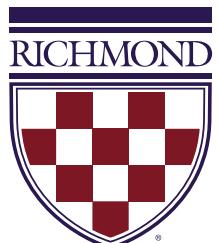


# YOU Kinda Already Know C++

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

```
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

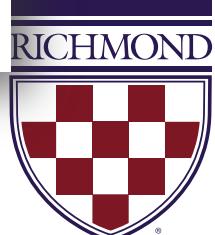
```
short eggs = 12;           // integer number : 2-bytes
int    number_of_steps = 3000; // integer number : 4-bytes
long   population = 4000000; // integer number : 8-bytes
float  temperature = 98.5;  // single-precision floating point : 4-bytes
double flying_time = 3.5;  // double-precision floating 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

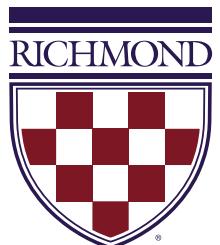
```
// The square function will input an integer value
// and return the square of that integer value.
int square(int value)
{
    return value * value;
}
```



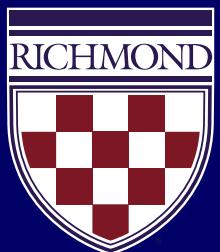
# YOU Kinda Already Know C++

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

```
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

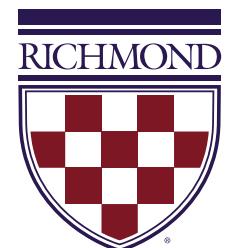
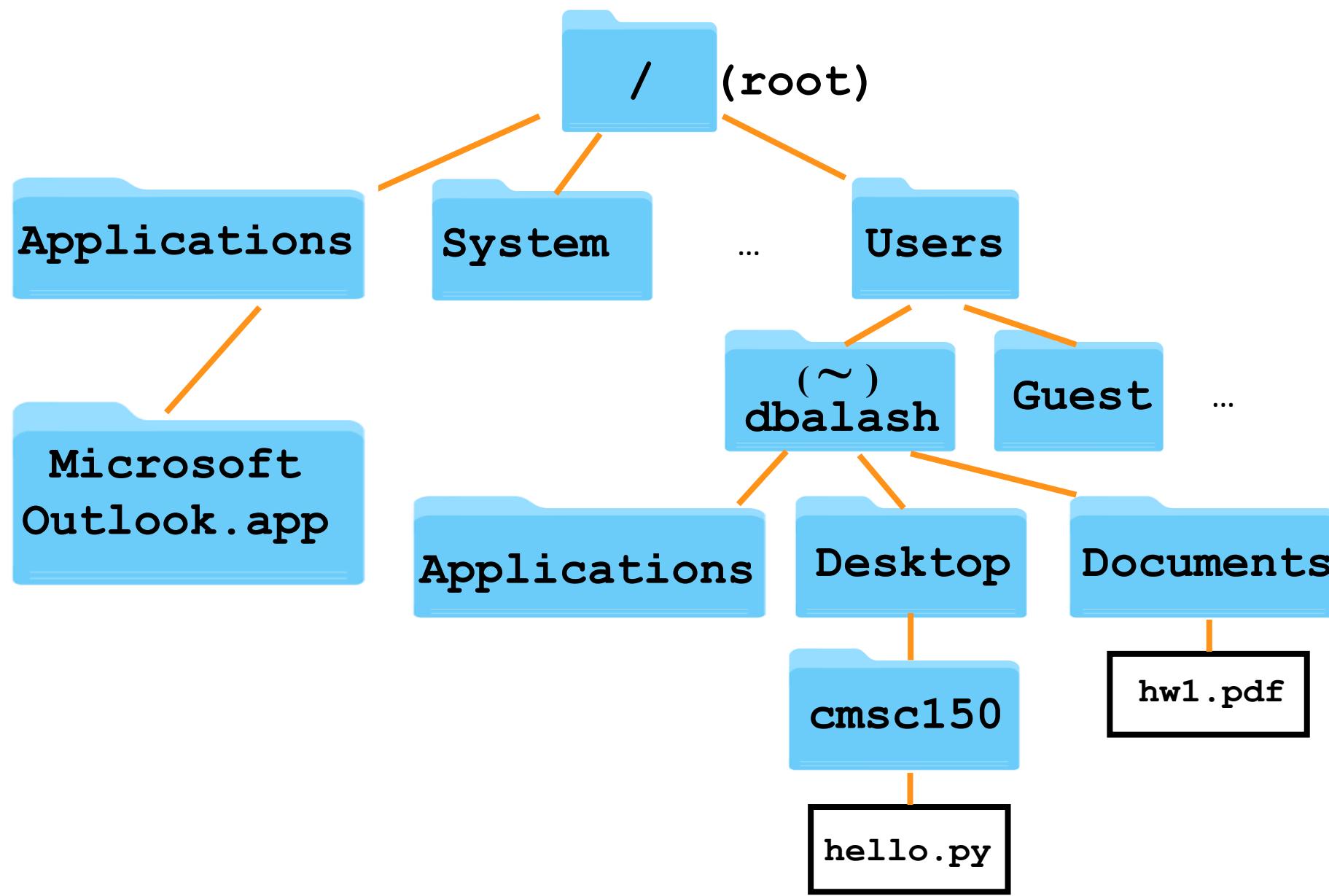


An aerial photograph of a university campus during spring. In the center is a large, ornate brick tower with multiple spires and arched windows. To its left is a white building with a gabled roof. The campus is surrounded by a variety of trees, including tall pines and leafy deciduous trees. In the foreground, there are paved walkways and green lawns where several people are walking or sitting.

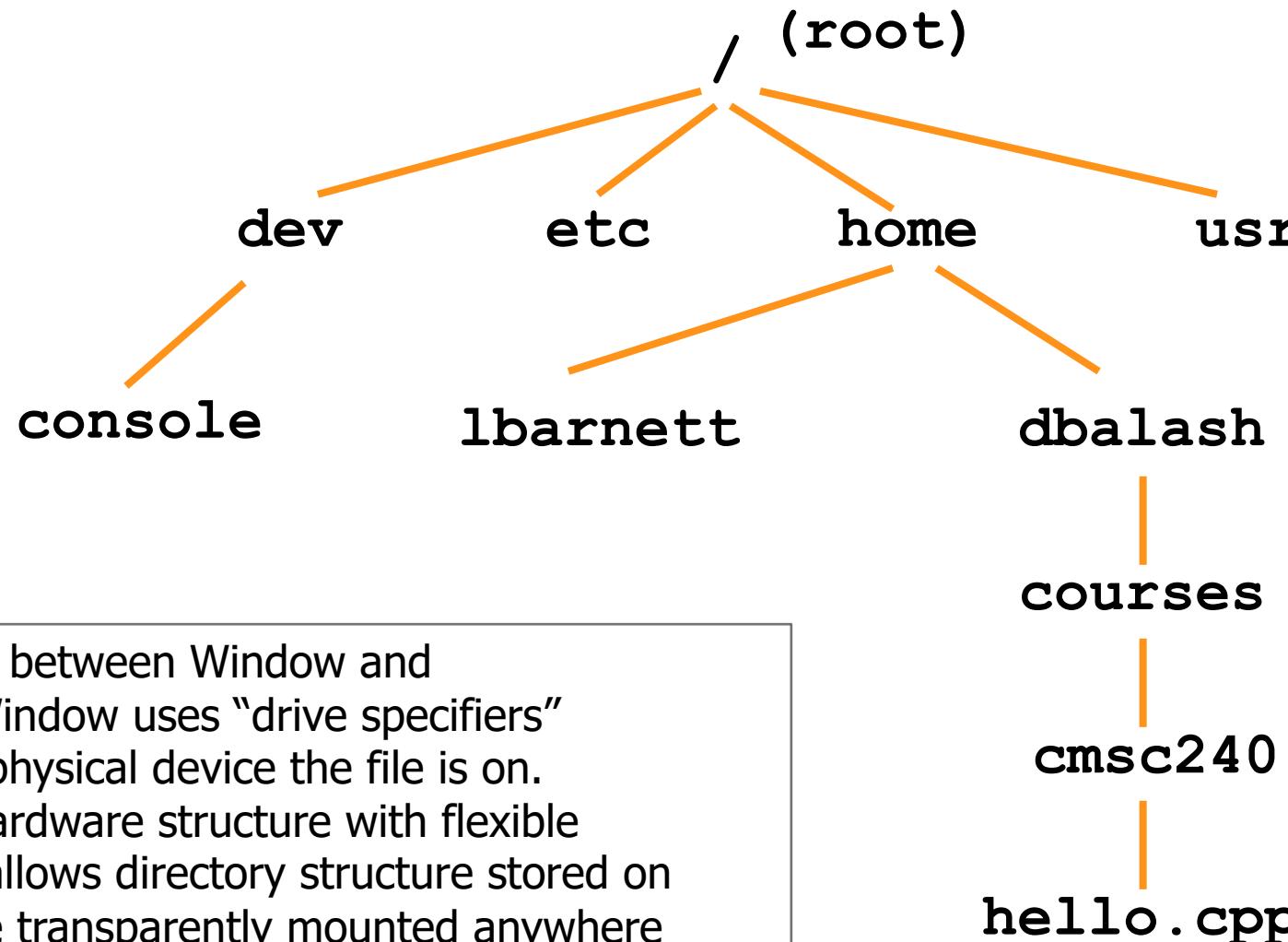
# Intro to Unix



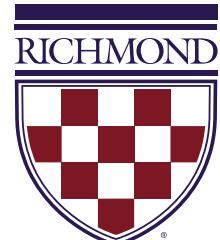
# Example Unix File System (on Mac)



# Example Unix File System (on Linux)



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

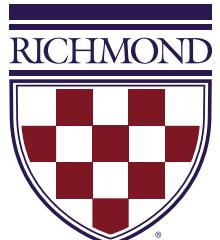
- Special directory names:
  - Root directory: /
  - Current directory: .
  - Parent directory: .. (allows you to go up)
  - User's home directory: ~
  - Some other user's home: ~sb4tc
- Two primary operations for navigating/locating:
  - cd <name> change directory to “name” (relative)
  - ls list all 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 ..
```

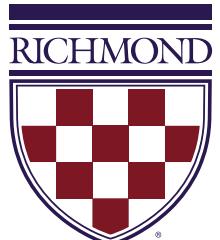
- change to home directory
- make a new cmsc240 directory
- cd to the cmsc240 directory
- print the present working directory
- redirect output to a new file
- display contents of file
- make a copy of the file
- rename the new file
- make another new directory
- move the file copy to new directory
- list current directory contents
- change to parent directory



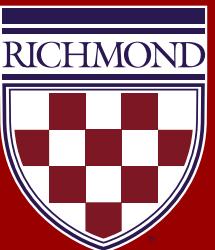
# Need Help? Use “man” pages...

```
$ 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!



An aerial photograph of a university campus featuring a prominent red brick tower with a spire. The campus is surrounded by lush green trees and manicured lawns. In the foreground, several paved paths lead towards the tower, with a few students walking along them. The sky is clear and blue.

# Intro to Version Control with Git



An aerial photograph of a university campus. In the center is a tall, ornate brick tower with multiple spires and arched windows. To its left is a large, light-colored building with a gabled roof. The campus is surrounded by a variety of trees, including several large evergreens and some with yellow or orange foliage. In the foreground, there are paved walkways and paths where several people are walking. The overall scene is bright and sunny.

# Environment Setup



An aerial photograph of a university campus. In the center is a tall, ornate brick tower with multiple spires and arched windows. To its left is a large, light-colored building with a gabled roof. The campus is surrounded by a variety of trees, including several large evergreens and some with bright yellow spring foliage. A paved walkway leads towards the tower, and there are other paths and green lawns in the foreground. Several people are walking on the paths.

# In-Class Coding Exercise

