Announcements

- New hiring/lab passwords will be emailed to you later today.

- Wed at 4pm there is an intro to lab overview.
Resources for this class

- Text book
- Transition guide (look for pdf on webpage)
- cplusplus.com
- Tutoring & office hours
This course: data structures in C++

First, C++. (More on that next.)

But - what is a data structure?

- a container for data

  - each has different functionality

    - speed
    - versatility
    - type of data
    - space
C++ versus Python

High level versus low level.

Python versus C++

Interpreted versus compiled.

C++: 2 steps: compile then run
Python: runs "on the fly"

Dynamic versus static typing

C++:
```c++
x = 5;
x = "hello";
```

Python:
```python
float x;
x = 5;
x = 'h';
```

Error
Why learn C++?

- faster
- ubiquitous
- understand low level details
- control
Comparison

Python

```python
def gcd(u, v):
    # we will use Euclid's algorithm
    # for computing the GCD
    while v != 0:
        r = u % v    # compute remainder
        u = v
        v = r
    return u

if __name__ == '__main__':
a = int(input('First value: '))
b = int(input('Second value: '))
print 'gcd:', gcd(a,b)
```

C++

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

int gcd(int u, int v) {
    /* We will use Euclid's algorithm
       for computing the GCD */
    int r,
    while (v != 0) {
        r = u % v;    // compute remainder
        u = v;
        v = r;
    }
    return u;
}

t main() {
    int a, b;
    cout << "First value: ";
    cin >> a;
    cout << "Second value: ";
    cin >> b;
    cout << "gcd: " << gcd(a,b) << endl;
    return 0;
}
```
White space - returns, tabs, etc. are ignored in C++

```c
int gcd(int u, int v) { int r; while (v != 0) { r = u % v; u = v; v = r; } return u; }
```

(C) not acceptable for HW
(Recall that these were very important in python)

Here, we use () and {} to mark loops, booleans, etc.
Compiling

In Python, you save code as gcd.py and then type "python gcd.py" to run it.

In C++:
- Save as gcd.cpp
- Type "g++ -o gcd gcd.cpp"
- Type "./gcd"