CS 161
Intro to CS I
Beginning to Program
Reminders...

- Read/Start Assignment 1
- Read Chap. 1 & begin Chap. 2
- Exercise Groups, Labs, and Office Hours are happening this week.
- Labs are posted on Canvas.
- Laptop required for Lab.
- Sign-up for exercise group on Exercises page.
- Assignments must compile and run on ENGR!
- Demos start next week (no laptop required).
- Sign-up for demo on home page, after you submit your assignment.
- Don’t be scared!!!!
Odds and Ends

- Lab quizzes just unlock next lab
- Labs are separate from exercises
- Exercises can be done on own or in group session
- Any book will do!!!!
- Help/Make-up for Lab1: Friday (1/7) 3-5pm, KEC 1003
Digital Realm

- Based on discrete #s
  - Specifically: Circuits
- Binary, i.e. base 2
  - 0 or 1
- What base do most people use?
  - What is the range for each digit?
- What is Hexadecimal?, i.e. base 16
  - What is the range for each digit?
Decimal, Binary, & Hex

- **Decimal**
  - Powers of 10

- **Binary**
  - Powers of 2

- **Base X to Base 10 conversion**
  - $32$ (base 10): $3*10^1 + 2*10^0 = 32$ (base 10)
  - $100000$ (base 2): $1*2^5 + 0*2^4 + 0*2^3 + 2*2^2 + 0*2^1 + 0*2^0 = 32$ (base 10)
  - How do we express $35$ (base 10)
    - base 2
    - base 16
More Binary

• What is each digit called?
• What is a Byte?
• How many numbers can be expressed in a Byte?
  – Signed/Unsigned
• What is the smallest number?
• What is the largest number?
Programming

- Writing **code** that a computer can **execute**
  - Does that mean we have to write in binary? **No!**

- High-level language
  - Translated Continuously during runtime
    - Interpreted - **Python**
    - Just in time compilation/caching
  - Translated Prior/Ahead of time to runtime
    - High-level -> machine language
    - High-level -> intermediate language
C++ Programming Environment

• Type a program in a .cpp file, `vim hello.cpp`
• Compile program file, `g++ hello.cpp –o hello`
• Run the compiled version, `hello`
• Example: `hello.cpp`

```cpp
#include <iostream>

int main() {
    std::cout << “Hello CS 161 Class!!!”;
    return 0;
}
```
More C++

• Libraries
  – Example: #include <iostream>

• Functions
  – Perform particular action/computation
  – Requires special function: **main**
    • int **main**() {....}

• Statements
  – Ended by semicolon
  – Examples:
    • std::cout << “Hello World”;
    • return 0;
Demo...

```cpp
#include <iostream>  // let's use cout, cin, etc.
#include <climits>   // has ULONG_MAX, LONG_MAX, etc. for sizes
using namespace std; // do not need std::cout, std::cin, std::endl, std::pow

int main()
{
  long l;  // making a long variable, l, to hold an unsigned long, uh-oh!
  l=ULONG_MAX;
  cout << ULONG_MAX << endl;  // print the unsigned long max value
  cout << l << endl;          // print the unsigned long max stored in the variable
  return 0;  // houston we have no error
}
```
Demo...
```cpp
#include <iostream> // let's us use cout, cin, etc.
#include <climits>   // has ULONG_MAX, LONG_MAX, etc. for sizes
using namespace std; // do not need std::cout, std::cin, std::endl, std::pow

int main()
{
  unsigned long l; // make an unsigned long, otherwise it is signed!
  l = ULONG_MAX;
  cout << ULONG_MAX << endl; // print the unsigned long max value
  cout << l << endl; // print the unsigned long max stored in the variable
  return 0; // houston we have no error
}
```

"first-2.cpp" 16L, 481C written 6,68 All
Demo...