Lecture 2
CS 137
Fall 2014
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Announcmments

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- Readings: 1-2 (Skim 3)
- Now Chapter 4-5
- Learn C Expressions
- Quiz September 18th in class about 10 minutes

Developing C programs Review

- Linux / Mac -> vim, emacs, eclipse
- Mac -> xcode
- Windows -> cygwin, visual c++, dev c, code blocks, NetBeans

Greatest Common Division

$$\frac{338}{806} =?$$

Basic idea, can computer with a physical way by using a stick. That is 806 units long and have another stick that is 338 units long. We want to find a piece of wood that would fit into 806 and 338 exactly.

Looking for something that would measure 338 units exactly as well as measure 806 exactly.

$$806 - 338 = 468$$

Thus 468 is a integer multiple multiple of it. **Euclid Algorithm**
Find the length of the longest "stick" that can measure both distances.

$$468 - 338 = 130$$

Thus 130 is also a integer multiple of it.

$$338 - 130 = 208$$

Go with a smaller problem.

$$208 - 130 = 78$$

$$130 - 78 = 52$$

$$78 - 52 = 26$$

$$52 - 26 = 26$$

$$26 - 26 = 0$$

Thus:

$$\frac{338}{806} = \frac{13}{31} * \frac{26}{26}$$

Euclid used repeated subtraction. (We can do better)

Can take out 338 as many times as possible from 806 with a remainder. With a total of 338 in 806 two times with a remainder 130.

806 mod 336 = 130
338 mod 130 = 78
130 mod 78 = 52
78 mod 52 = 26
52 mod 26 = 0

C code for GCD

```c
#include <stdio.h>

int main(void){
	int a = 806; //image a latter that contains these values in memory
	int b = 338;
	int temp = 0; //temp is not a unique key word

	 while(b != 0){
		temp = b;
		b = a % b; //in C mod is represented by %
		a = temp;
	 }

	printf("%d\n", a); //%d represents a place holder for a integer that will
	   be replaced by a when the program is run

	return 0;
}
```

Input and Output

```c
#include <stdio.h>

int main(void){
	printf("format string", argument to print, can be any expression...);
	//e.g printf("%d + %d = %d", 10, 20, 100);
	//Output: 10 + 20 = 100

	scanf("%d", &a); //reading integers into a
	//looks at input from the keyboard and put it in a
	//&a means there is a spot in memory called a and this is a reference to
	   its location

	return 0;
}
```

```c
#include <stdio.h>

int main(void){
	int a = 0;
	int b = 0;
	int temp = 0;

	scanf("%d", &a); // get a integer and put it in a
	scanf("%d", &b); // get a integer and put it in b

	while(b != 0){
		temp = b;
		b = a % b;
		a = temp;
	}

	printf("%d\n", a);

	return 0;
}
```

Errors: What if a is bigger than b? What if a string is entered instead of integer?

What your terminal will look like:

```
%nano gcd.c
%gcc gcd.c
%./a.out
806
338
26
%
```