Lab 2

C Review
Structs
Linked Lists

September 15th, 2010
James Marshall
(Slides in white from Prof. Haya Bragg)

Motivation

- Therac-25
  - Dosed patients with 100x the intended radition
  - Multitude of errors in programming, hardware, design, and process
  - At least 3 people died as a direct result

C Review

- Mira made some great slides, on blackboard.

  - I will review them at the end of lab.

- Great resources online

  - Read and try the tutorials

  - Academic honesty acid test: can you explain how your code works? Could you reproduce it without any references?

How to Improve

- To learn C, you must write C.

- For a challenge: www.projecteuler.net

Normal C Memory Management

- A program's *address space* contains 4 regions:

  - stack: local variables, grows downward

  - heap: space requested for pointers via `malloc()`; resizes dynamically, grows upward

  - static data: variables declared outside main, does not grow or shrink

  - code: loaded when program starts, does not change

~ FFFF FFFF $_{hex}$

stack
heap
static data
code

~ 0 $_{hex}$
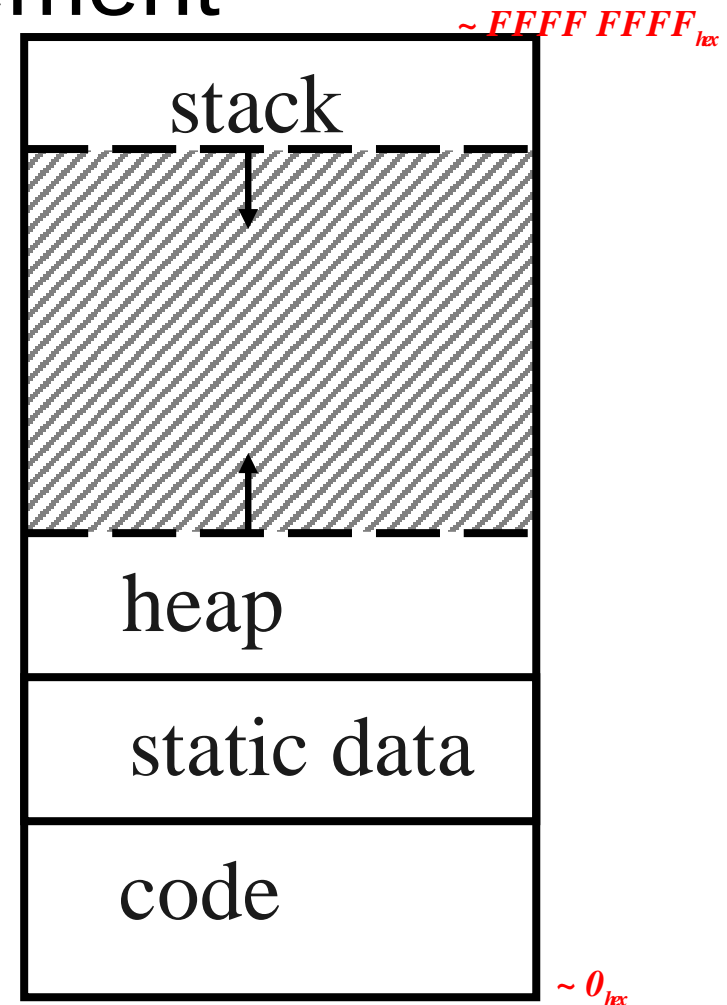
Functions

- Scope... Globals and { }
- Pass by value
- Pass by reference

Insert/Push a node in front of a list

```
void WrongPush(struct node* head, int data) {
    struct node* newNode
        = malloc(sizeof(struct node));

    newNode->data = data;
    newNode->next = head;
    head = newNode; // NO this line does not work!
}
```

Linked Lists, revisited

- Can use to implement two more data structures
    - Stacks (FILO)
    - Queues (FIFO)
- Stack examples?
- Queue examples?

Your Turn

- Write a queue program for a business

- Two tasks:

  - add person to queue

  - call next person to service

- Must also keep track of each customer's problem ID.

- Use scanf() to get input from user.