

Recursion

3-22-2010

Opening Discussion

- What did we talk about last class?
- How are your projects coming?
- Minute Essay Responses
 - Suggestions
 - Applets
 - Smart actors
 - Destruction!
 - Another predator/Godzilla
 - Easiest

Objective

- We are looking at a two week objective here. We want to build up to making actors that can deal with obstacles and move around them.
- We will do this with a technique called recursion.
- This week we deal with building an understanding of basic recursion.

Start with Math

- Assume I gave you this function in a math class. What would its value be for a few different numbers? What is this function?

$$f(n) = \begin{cases} 1 & x < 2 \\ n * f(n-1) & \textit{otherwise} \end{cases}$$

Definition of Recursion

- A recursive function, in math or computer science, is a function that is defined in terms of itself.
- In a program that means we have a function that calls itself.
 - The call must be conditional. Otherwise we get infinite recursion.

Our Math Function in Code

- Let's write a function in Java that calculates the function we have already looked at.
- We should call it a few times to make sure it works on some different values.

Recursion for Iteration

- What we just did we could have done with a loop. The simplest forms of recursion provide iteration, just like loops do.
- To get this a method calls itself once and changes an input parameter to the next case for the loop.
- Let's use recursion to add multiple actors to a world.

Counting Down

- We can very easily alter the last method so that we “count down”.
- It want to have print statements that will print out values going from the value we make the first call with down to one.
- We could do this with a loop, but I want to do it with recursion.

Counting Up

- Now I want to edit this method so that it counts up. How should we go about doing that?

What is going on?

- The last version of counting up might seem quite odd. The question is, how does it work?
- The computer gives each method a bit of memory when it is called. All of these bits together are referred to as the call stack. This gives recursion more power than a loop because it has a memory of what has happened.

Minute Essay

- What questions do you have about our topic for today?
- Remember that your first project is due on Wednesday.