

Nested Structures and Recursive Types

12-01-2003

Opening Discussion

- What did we talk about last class?
- Do you have any questions about the assignment?

Motivation

- We have looked at arrays of structures and arrays in structures. Sometimes we want to have structures that are complex enough that they should be composed of other structures.
- For example, if we had a point structure, we might represent a triangle as having three points inside it. What if we wanted a general polygon?

Structures Inside Structures

- Imagine that we want to represent a course section in our program. This structure would need to have data on the section, including the students in it.
- To do this we probably want the section structure to have an array of student structures in it. Accessing the members of students would require "getting" the students from the section first.

Dynamic Structures

- Because not all sections have the same number of students, this is a place where we would like to have a dynamic array in the structure.
- To do this we would need to keep a pointer member in the structure as well as the number of elements that are allocated for it. Sometimes we might want to have pointers that could point to single elements that are optional.

Recursive Structures

- In some cases we want to have a structure that refers to something of its own type. Imagine if you wanted to have a person structure you might want to keep track of all that person's friends or contacts. This would be a person that keeps track of other people.
- How would you want to do this in your code?

Recursive Structures

- We can't build a recursive structure by having the structure actually contain instances of itself. If we did this the structure would be infinite in size.
- To get around this, the self-referencing part of the structure must be a pointer so that this problem doesn't occur.

Code

- Let's write some code that has structures inside other structures to see how we access the various members. We can also see what is needed to make them dynamic or self-referencing. We'll do this going back to our code for programming teams we did with structures before.

Minute Essay

- What did we talk about today? Can you give me an example of when you might use it?
- Assignment #10 is posted. It is listed as due on the last day of class, but I'm going to accept it until the 15th if anyone wants to work on it during the finals period.
