Pointers and Functions: Pass by Reference

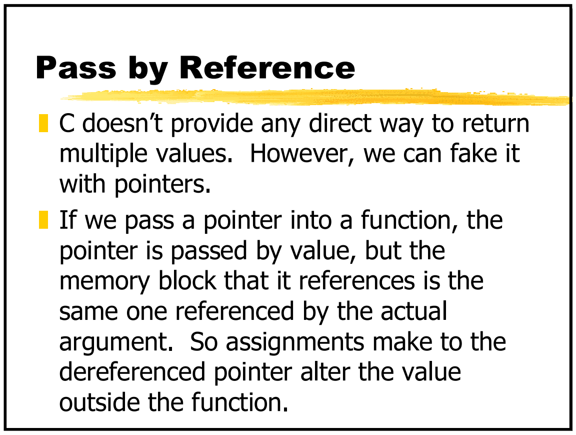
10-9-2002

Opening Discussion

- What did we talk about in the class before the test?
- When we talked about functions I said that all the values we pass are passed by value, what does that imply?

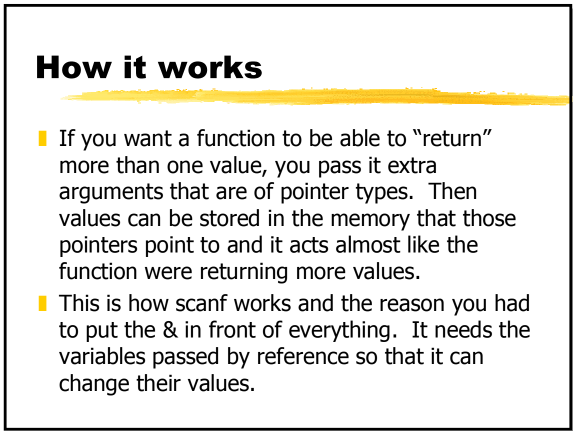
Returning Two Values

- One of the limitations with functions that we have seen is that they can only return one value of a single type. Sometimes it would be helpful to have a function return more than one value and possibly of different types.
- Consider a function that converts Cartesian coordinates to polar coordinates, or a function to do a “time step” in the Kepler problem (Assn #3)



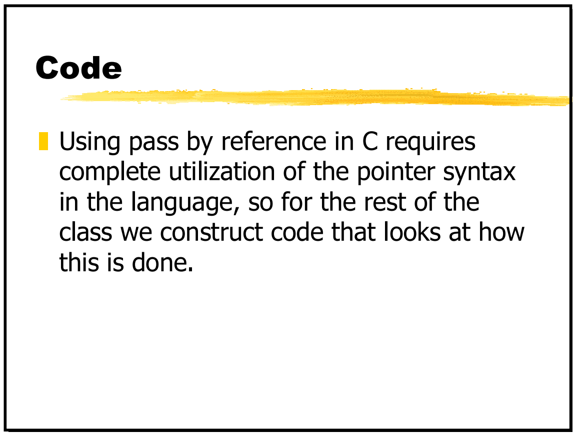
Pass by Reference

- C doesn't provide any direct way to return multiple values. However, we can fake it with pointers.
- If we pass a pointer into a function, the pointer is passed by value, but the memory block that it references is the same one referenced by the actual argument. So assignments make to the dereferenced pointer alter the value outside the function.



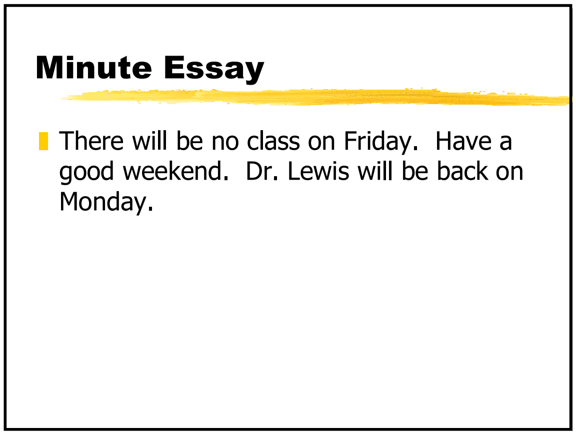
How it works

- If you want a function to be able to "return" more than one value, you pass it extra arguments that are of pointer types. Then values can be stored in the memory that those pointers point to and it acts almost like the function were returning more values.
- This is how scanf works and the reason you had to put the & in front of everything. It needs the variables passed by reference so that it can change their values.



Code

- Using pass by reference in C requires complete utilization of the pointer syntax in the language, so for the rest of the class we construct code that looks at how this is done.



Minute Essay

- There will be no class on Friday. Have a good weekend. Dr. Lewis will be back on Monday.