Arrays

10-15-2003

Opening Discussion

- What did we talk about last class?
- Do you have any questions about the assignment (true it isn't due for a while, but the next one is posted)?

Storing Multiple Values

- When trying to solve problems with a computer program, it is quite common that you want to be able to store data related to many different real world entities without knowing exactly how many you will have.
- With what you have learned, can you do this? How?

Arrays

- The most direct way to store, access, and work with multiiple values in C is with arrays.
- Arrays allow you to use integer indexes to access multiple pieces of data of the same type. The index can be any int type expression.

```
int a[5];
a[2]=3;
printf("%d\n",a[4]);
```

Indexing into Arrays

- Arrays in C are "zero-referenced". This means that the first element of the array has an index of zero. If there are n elements, the last index of the array has index n-1.
- So on the previous slide, the valid expressions with a are a[0], a[1], a[2], a[3], and a[4].

Types of Arrays

- Arrays can be declared for any type in C so you can have arrays of ints, doubles, floats, chars, etc.
- You get a chunk of memory big enough to hold the proper number of that type.
- Strings in C are actually arrays of chars and the end of the string is denoted with a zero stored in the array. These are called null terminated strings.

Initializing Arrays

- When an array is declared, it has garbage in it unless initialized, just like a normal variable.
- You can initialize with the declaration, or using a loop.

```
int j,grades[]={95,87,89,94};
double position[30];
for(j=0; j<30; j++) {
     position[j]=0.0;
}
```

Passing Arrays to Functions

- You can pass arrays in as arguments to a function much like you would any normal value.
- Arrays in C don't store how long they are though so typically you have to pass in an int giving the length as well.

```
int SumArray(int a[],int len);
```

Summing Arrays

- A common operation to perform on an array is to sum the elements.
- Let's write the function whose signature was shown on the previous slide to sum the elements of an array.
- What do we need to do to be able to return the sum?

Code Involving Arrays

- Now let's write a different function called FillArray that takes an array of ints, a length, and a value int, then assigns all the elements to be that value.
- Let's put a call to this function in our main and look at the values in the array before and after the call.

Pass By Reference

- What we just saw is an example of pass-by-reference which we talked about last week today. What does this tell you about the arrays and what gets passed?
- Arrays are always passed by reference so you have to be careful when passing them to functions that the function doesn't cause unwanted side effects.
- Comments on functions should document the side effects.

Minute Essay

- Write a function that takes an integer array and the length of the array. Set each element of the array equal to its index.
- I'll post the midterm grades on the submission application as soon as they are done.