Arrays

10-5-2001

Opening Discussion

- Do you have any questions about the quiz?
- What did we talk about last class?
- Today we are going to move to the topic of arrays. From the reading can anyone explain to me what an array is? Why do we want to use them?

What is an Array?

- So far when we have wanted to store values we have declared individual variables for each value. It is nice to be able to store and access multiple values by numeric indices.
- We can't write a loop to print out the variables in these declarations.

```
int a,b,c,d,e,f,g;
int n1,n2,n3,n4,n5,n6;
```

Array Syntax - Declaration

❚ An array gives us the ability to access data items by number so we can work with them more easily.

❚ An array is declared with a type and name, just like normal, but that is followed by a number of elements in square brackets.

```
int a[25],b[15];
string name[20];
double speed[1000];
```

Array Syntax - Use

❚ When we want to assign to or use an element of an array we do so just like any other variable, but we have to put an integer expression in square brackets following the variable name. If an array has length n, its valid subscripts are 0..n-1.

```
a[0]=3;
cin >> name[i];
speed[3*n]+=v[3*n]*dt;
```

Constant Length

❚ In the C++ standard, the number of elements in an array declared in the way we are discussing here must be a constant, not a variable expression. The g++ compiler will let you declare variable sized arrays but I don't recommend you get used to that.

```
int a[5]; // portable
int a[n]; // non-portable unless n
     // is const.
```

Arrays as Arguments

❚ Arrays can be passed as arguments to a function. When you do this the formal arguments have no length specified in the brackets.

❚ C++ does not provide a way to get the length of an array so you often need to have an integer parameter for length as well.

```
void sort(int num[],int length);
```

const Array Arguments

❚ Unlike regular arguments, array arguments can be changed by default (normally it requires passing it as a reference). If you want to make sure a function doesn't modify an array it has to be declared const.

```
int sum(const int vals[],int length);
```

Minute Essay

❚ The previous slide had the prototype of a function that would return the sum of all the elements in an array of integers. Write the body of this function.

❚ I'll be posting more "drill" problems to the web page as I think of them so check there occasionally.

❚ On Monday I'll hand back your assignments.