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# Arrays

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## Last Time

- ◆ We
  - Have just about completed talking about functions
- ◆ Today we will
  - Start a new topic. We will examine C++ arrays

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## Arrays

- ◆ Arrays are a way of storing a collection of variables of the same data type
- ◆ Example: Store 10 grades
  - Using single variables--need 10 variables
  - Using array--need one array of size 10
- ◆ Declaration:
  - `double grade[10];`
  - `string name[2];`

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## Using Arrays

- ◆ Declaration

```
double temp[5];
```
- ◆ Assign

```
temp[0] = 32.0;
temp[1] = 55.3;
temp[2] = 72.1;
temp[3] = 85.0;
temp[4] = 20.0;
```
- ```
for (int i = 0; i < 5; i++)
    temp[i] = 0.0;
```
- ```
double temp[] = {32.0, 55.3, 72.1, 85.0, 20.0};
```

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## Memory Storage

- ◆ Single variable--one memory location. Size?
- ◆ Array--multiple memory locations. Size?

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## Accessing Arrays

- ◆ After initialized, can read array
- ◆ Make sure you don't try to access array outside of bounds
- ◆ Indices should be 0 through size -1

## General Form

**datatype identifier[size];**

- ◆ Same as regular variable declaration, but need to give size of array.
- ◆ Size must be constant integer expression greater than zero.
- ◆ Index array through [ ]. Indices must be integers (or integer expressions) in the range 0 through size - 1.
- ◆ There is no array[size] element!!

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## What is the Output?

```
const int size = 5;
int i,j,k;
int vals[size] = {10, 9, 8, 7};
char grades[] = {'A', 'B', 'C', 'D', 'F'};

i = 2;
j = 3;
k = 7;

cout << vals[2] << vals[j] << vals[j-i];
cout << grades[j] << grades[j%i] << grades[i%j] <<
    grades[k/i];
cout << grades[i] << grades[vals[1]%4];
cout << grades[vals[1]];
```

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## Problems

- ◆ P#1: Write a C++ program segment that will switch the values in the first and third elements of the array values.
- ◆ P#2: Write a C++ program segment that will declare an integer array nums of size 100. Then place the first 100 positive even integers into the array nums starting with the first element and proceeding to the end of the array.
- ◆ P#3: A data file of grades exists with an unknown number of characters. Write a C++ program segment that will read these characters into a character array. Assume no more than 1000 characters exists in the data file.

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## Summary

- ◆ In today's lecture we covered
  - Declaring arrays
  - Initializing arrays
  - Using arrays
- ◆ Readings
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