
Functions

Chapter 6, 8

Review

- Functions
 - Prototype
 - Call
 - Definition
- Passing arguments
 - By value
 - By reference

Arrays as Function Arguments (8.8)

- You can pass an array as an argument to a function

```
void printIntArray(int arr[], int size);  
  
int main()  
{  
    int values[] = {5, 6, 0, 1, 2, 3, 4};  
    const int SIZE = 7;  
  
    printIntArray(values, SIZE);  
    return 0;  
}
```

Array Name

Arrays as Function Arguments

```
void printIntArray(int arr[], int size)
{
    for(int i = 0; i < size; i++)
    {
        cout << arr[i] << endl;
    }
}
```

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Passing Single Array Elements

- Passing single array elements is like passing in a single variable

```
void showValue(int num);

int main()
{
    int values[] = {5, 6, 0, 1, 2, 3, 4};
    const int SIZE = 7;
    for(int i = 0; i < SIZE; i++)
    {
        showValue(values[i]);
    }
    return 0;
}
```

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Passing Arrays into Functions

- Arrays are always passed by reference

- What does this mean?

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Q.1. Practice

- Write a function that will accept an integer array and a size for that array, and return the sum of all the elements in the array

- `int sumArray(int array[], int size);`

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Q.2. Practice

- Write a function that will accept an integer array and a size for that array and return the highest value in the array

- `int getHighest(int array[], int size);`

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Variable Scope (6.10)

- Scope: where can a variable be used?
- Local Scope: variable is only available locally (within a function, loop, etc.)

```
int foo(int x)
{
    int value = x * 2;
    for(int k = 0; k < value; k++)
    {
        value += (k % 3);
    }
    value += k; // ERROR
    return value;
}
```

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Variable Scope

- Global Scope: variable is available everywhere in the source code
 - often a bad idea!

```
int lowervalue = 0;

int foo(int x)
{
    int value = x * 2;
    for(int k = lowervalue; k < value; k++)
    {
        value += (k % 3);
    }
    return value;
}
```

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Variable Scope

- Local variables can hide other variables

```
int lowervalue = 0;

int foo(int lowervalue)
{
    int value = lowervalue * 20;
    for(int k = lowervalue; k < value; k++)
    {
        value += (k % 3);
    }
    return value;
}
```

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Variable Scope

```
int value = 99;
int foo(int lowervalue)
{
    int lowervalue = 20; // ERROR
    for(int k = lowervalue; k < value; k++)
    {
        value += (k % 3);
    }
    return value;
}
```

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Q.3. Practice: What is the result?

```
int number = 0;

int foo(int value)
{
    int number = value * 10;
    for(int value = 0; value < number; value++)
    {
        value += number;
    }
    return value;
}

int main()
{
    int number = 2;
    cout << " value: " << foo(number);
    return 0;
}
```

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Q.4. Static Local Variables (6.11)

- What happens here?

```
void foo()
{
    int value = 20;
    cout << " value: " << value << endl;
    value *= 22;
}

int main()
{
    foo();
    foo();
}
```

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Q.6. Static Local Variables

- Sometimes we want a function to retain a value between uses
 - static local variables

```
void foo()
{
    static int value = 20;
    cout << " value: " << value << endl;
    value *= 2;
}

int main()
{
    foo();
    foo();
}
```

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Q.7. Practice: Static Local Variables

- Write a function that will count the number of times it has been called and print that to the screen.
- Write a function that will take one integer as a parameter and produce a running sum and running average of the values used as arguments when it is called.

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Default Arguments (6.12)

- “Default arguments are passed to the parameters automatically if no argument is provided in the function call” p343

```
void stars(int numberOfStars = 5)
{
    for(int i = 0; i < numberOfStars; i++)
    {
        cout << "**";
    }
    cout << endl;
}

int main()
{
    stars(10);
    stars();
}
```

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Default Arguments

```
// specify the default arguments the first time
// you define the function
void stars(int numberOfStars = 5);

int main()
{
    stars(10);
    stars();
}

// do not redefine the default arguments here
void stars(int numberOfStars)
{
    for(int i = 0; i < numberOfStars; i++)
    {
        cout << "**";
    }
    cout << endl;
}
```

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Q.8. Practice: Default Arguments

- Write a function that will accept either one or two integers as parameters and return the area of a square (if one parameter is specified) or a rectangle (if two parameters are specified)

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Overloading Functions (6.14)

- “Two or more functions may have the same name as long as their parameter lists are different.” p354

- return data type is *not* considered

```
int area(int length);  
int area(int length, int width);
```

```
int square(int value);  
double square(double value);
```

```
int increment(int value); // ERROR  
double increment(int value); // ERROR
```

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Q.9. Practice: Overloaded Functions

- Write two overloaded functions that will produce the sum and average of three integers or three doubles.

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