

The Running-Value Pattern

Summing, counting, and finding the slowest page load are the same loop, walked once -- and it's the pattern that fixes the average bug from Chapter 4.

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Here is the correct answer to a bug you already met. In Chapter 4, Bug Hunt #4 reported an average of 98 ms that should have been 128. This computes it properly, casting one side to double so the fraction survives, exactly as Chapter 2 taught:

```
public class Arr2 {  
    public static void main(String[] args) {  
        int[] responseTimes = {120, 95, 210, 88};  
        int total = 0;  
        for (int i = 0; i < responseTimes.length; i++) {  
            total += responseTimes[i];  
        }  
        double average = (double) total / responseTimes.length;  
        System.out.println("Total : " + total);  
        System.out.println("Average: " + average + " ms");  
    }  
}
```

```
Total : 513  
Average: 128.25 ms
```

The same shape, three jobs

The pattern of walking an array while carrying a running value is one you will use constantly. Sum, count, and "find the largest" are all the same shape. Here is the largest:

```
public class Arr3 {  
    public static void main(String[] args) {  
        int[] loadTimes = {340, 180, 520, 260, 410};  
        int slowest = loadTimes[0];  
        for (int i = 1; i < loadTimes.length; i++) {  
            if (loadTimes[i] > slowest) {  
                slowest = loadTimes[i];  
            }  
        }  
        System.out.println("Slowest page load: " + slowest + " ms");  
    }  
}
```

```
Slowest page load: 520 ms
```

Start by assuming the first item is the answer, then walk the rest and keep a better one whenever you find it. Notice the loop starts at `i = 1`, because position 0 is already your starting guess -- a

deliberate, correct use of starting at one, very different from the silent off-by-one bug of the last chapter, which skipped real data by accident.

Every running-value loop you write follows this same shape: start with a value that makes sense before you've seen anything (0 for a sum, the first item for a max), then walk the rest, updating as you go. Once you can see that shape, sum, count, and max stop being three things to memorize and become one thing to recognize.