Henry Mound
APCS Thomas Cooper

Array Exercises (pp. 433-435)

EX 8.1 Which of the following are valid declarations? Which instantiate an array object? Explain your answers.

```
int primes = {2, 3, 4, 5, 7, 11};
```

This is not a valid declaration because the array initializer '[]' should have been added in the declaration.

```
float elapsedTimes[] = {11.47, 12.04, 11.72, 13.88};
```

This is a valid declaration of a float array.

```
int[] scores = int[30];
```

This is not a valid declaration because the keyword 'new' was never used to declare the array. It should have been: int[] scores = new int[30];

```
int[] primes = new {2, 3, 5, 7, 11};
```

This is not a valid declaration because the keyword 'new' is not necessary when just assigning a list of values to an array.

```
int[] scores = new int[30];
```

This is a valid declaration of an int array.

```
char grades[] = {'a', 'b', 'c', 'd', 'f'};
```

This is a valid declaration of an char array.

```
char grades[] = new char[];
```

This is not a valid declaration, because there is no size given to the char array. A valid instantiation would have been: char grades[] = new char[];

EX 8.2 Describe five programs that would be difficult to implement without using arrays.

1. It would be useful to use an int array in a school grade keeping system.You would be able to have the different letter grade ranges stored in the array. For example: int[] grades = {100, 90, 80, 70, 60, 50};

2. Arrays are also useful in games. For example, you could have an array for difficulty in each level. By doing this, you can adjust the difficulty just by changing the corresponding index of the int in the array.

3. You could also use an array in a store program. You can store the prices of items in a double array.

4. It would be difficult to create a program that calculates the average of golf scores without an array. With an array, you could loop through all the scores and average them.

5. It would be hard to create a graphing program without arrays. You could create an array that saves all of the coordinate values in a line graph.

EX 8.3 Describe how an element in an array is accessed in memory. For example, where is myArray[25] stored in memory.

All of an array's elements are stored one right after another in memory. To determine the address of any particular element, the index - 25 - is multiplied by the size of each element, and added to the memory address at the starting point of the array. That's why array indexes begin at zero instead of one.

EX 8.4 Describe what problem occurs in the following code. What modifications should be made to it to eliminate the problem?

```
int[] numbers = {3, 2, 3, 6, 9, 10, 12, 32, 3, 12, 6};
for (int count = 1; count <= numbers.length; count++)
  System.out.println (numbers[count]);
```

The code should be changed from "count = 1" to "count = 0". This is because the current code throws an ArrayIndexOutOfBoundsException since an array's initial index is 0, not 1. The code attempts to print a non existent value.

EX 8.5 Write an array declaration and any necessary supporting classes to represent the following statements:

a. students' names for a class of 25 students

```
String students[] = new String[25];
```

b. students' test grades for a class of 40 students

```
double grades[] = new double[40];
```

c. credit-card transactions that contain a transaction number, a merchant name, and a charge.

```
CreditCard transactions[];
public CreditCard{
        private int number;
        private String merchantName;
        private double charge;
}
```

d. students' names for a class and homework grades for each student.

```
Classroom[] studentClass;
public Classroom{
        private String className;
        private double homeworkGrade[];
}
```

e. for each employee of the L&L International Corporation: the employee number, hire date, and the amount of the last five raises.

```
LLEmployee[] employees;
public LLEmployee{
        private int employeeNumber;
        private double[] raises = new double[5];
        private Date hireDate;
}
```

EX 8.6 Write code that sets each element of an array called nums to the value of the constant INITIAL.

```
for(int x = 0; x < nums.length; x++)

        nums[x] = INITIAL
```

EX 8.7 Write code that prints the values stored in an array called names backwards.

```
for(int x = names.length - 1; x >= 0; x—)

        System.out.println(names[x]);
```

EX 8.8 Write code that sets each element of a boolean array called flags to alternating values (true at index 0, false at index 1, etc.)

```
for(int x = 0; x < flags.length(); x++){

    if((x % 2) == 0)

        flags[x] = true;

    else flags[x] = false;
```

EX 8.9 Write a method called sumArray that accepts an array of floating point values and returns the sum of the values stored in the array.

```
public int sumArray(float[] array){

    float sum = 0.0;

    for(float x : array)

        sum += x;

return sum;

}
```

EX 8.10 Write a method called switchThem that accepts two integer arrays as parameters and switches the contents of the arrays. Take into account that the arrays may be of different sizes.

```
public void switchTem(int[] a, int[] b){

    int[] temp1 = a;

    int[] temp2 = b;

    b = temp1;

    a = temp2;

}
```

EX 8.11 Describe a program for which you would use the ArrayList class instead of arrays. Describe a program for which you would use arrays instead of the ArrayList class. Explain your choices.

You would use an ArrayList for storing values that are not primitive types. For example, if I created a class called *Item* that holds a serial number and a name, then I would use an ArrayList. On the other hand, if I just wanted an array that holds a bunch of serial numbers, I could use an array of longs instead of an ArrayList.