Practice S05P08: Sound Processing II: Speed Change

http://www.comp.nus.edu.sg/~cs1010/4_misc/practice.html

Week of release: Week 5

Objectives: Array

Task statement:

A sound wave can be represented digitally as an array of integers. For example, the sound wave shown in Figure 1 can be represented as {1, 2, -1, -2, 1, 2, 0, -1, 1, 2, 1}.

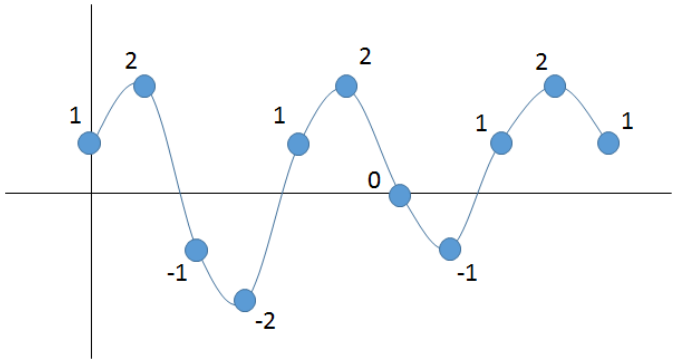

Figure 1

Given an integer *k*, we can make a sound wave *k* times slower or faster by manipulating the integers in the array.

For example, to change the sound wave in Figure 1 to **2** times slower, we repeat each integer in the array **twice**. The resulting array is {1, 1, 2, 2, -1, -1, -2, -2, 1, 1, 2, 2, 0, 0, -1, -1, 1, 1, 2, 2, 1, 1}.

In contrast, to change the same sound wave to **2** times faster, we merge every **2** integers into 1 by computing their average. The resulting array is {1, -1, 1, 0, 1}. In this example, the first 5 pairs of integers of the given sound wave are averaged to the first 5 integers in the resulting sound wave: (1+2)/2 → 1, ((-1) + (-2))/2 → -1, and so on. To keep things simple, we ignore the last integer, which is not in a pair, in the given sound wave.

Write a program **speed.c** to perform the following:

- Read in a positive integer value *size*, which indicates the number of integers in the given sound wave. You may assume that *size* is at most 100.
- Read in *size* integers, which represent the given sound wave.
- Read in an integer *k* (a non-zero integer in [-8, 8]), which represents the speed change.
- If *k* is negative, make the sound wave *-k* times slower (e.g., *k* = -2 → 2 times slower); otherwise, make the sound wave *k* times faster (e.g., *k* = 2 → 2 times faster).

Your program should have a function called **scan()** to read in the size of the sound wave as well as the actual sound wave, a function called **slowdown()** to slow down the sound wave, and a function called **speedup()** to speed up the sound wave. A function called **print()** is given for printing a sound wave.

You may assume that in the case of speeding up a sound wave by *k* times, the size of the given sound wave is at least *k*.

Sample run #1:

```
Enter size: 4
Enter values:
1 2 -1 -2
Enter speed change: -2
The sound wave after speed change:
1 1 2 2 -1 -1 -2 -2
```

Sample run #2:

```
Enter size: 4
Enter values:
1 2 -1 -2
Enter speed change: 2
The sound wave after speed change:
1 -1
```

Sample run #3:

```
Enter size: 3
Enter values:
1 2 -1
Enter speed change: -4
The sound wave after speed change:
1 1 1 1 2 2 2 2 -1 -1 -1 -1
```

Sample run #4:

```
Enter size: 7
Enter values:
1 2 -1 -2 1 2 0
Enter speed change: 3
The sound wave after speed change:
0 0
```