

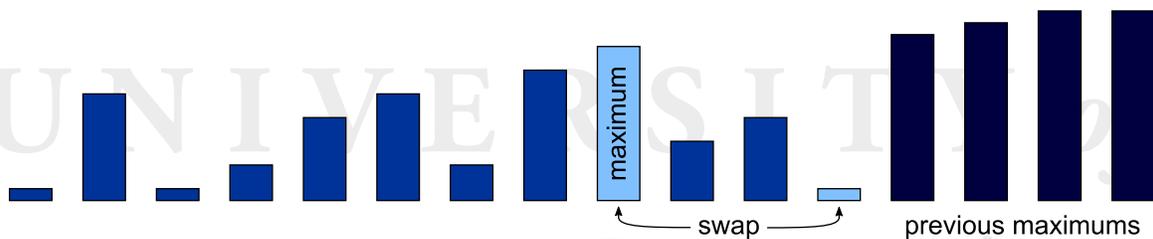
## Lab 6: Selection Sort

Create an array of random numbers, and then sort them using selection sort.

Your program will ask for the size of the array of `ints` to be created. It will then fill the array with random values, ranging between 1 and the size of the array  $n$ . It will then sort it and report how many milliseconds the sorting took. If the length of the array is 100 or less, it should also print the whole array before and after sorting.

```
Please enter the array size: 16
Unsorted: [14, 9, 1, 3, 16, 15, 3, 11, 13, 5, 7, 1, 1, 16, 7, 9]
Sorted: [1, 1, 1, 3, 3, 5, 7, 7, 9, 9, 11, 13, 14, 15, 16, 16]
Time taken to sort: 0 ms
```

Recall that selection sort consists of scanning through the array  $n - 1$  times. Each time it finds the maximum element and swaps it to the end. (Or, alternatively it can find the minimum element and swap it with the beginning.) Each pass through the array is shorter by 1, so that once an element is swapped to the end, it will never be swapped out.



Here are some hints:

- You can fill the array with the `Math.random()` method, which returns a random double  $r$  such that  $0 \leq r < 1$ . If you multiply this number by the array's size, the new number  $nr$  will be in the range  $0 \leq nr < n$ . Finally cast it to an `int` and add 1, so that you have an integer in the proper range  $1 \leq i \leq n$ .
- To print out an array nicely, use the `Arrays.toString()` method. If you pass it an array, it will return a human-readable string representing it, that can be printed.
- To time the sorting process, use the method `System.currentTimeMillis()`, which takes no arguments and returns the number of milliseconds since January 1, 1970 GMT. You will need to use this function twice: when the sorting begins, and when it ends. You can then subtract the two to get the elapsed time. Note that this method returns a `long`, since the value is too big for an `int`. Be sure to only record the time *immediately* before and after the sort. (You don't want to accidentally record the time taken to allocate the array or print it out, since both take a lot of time to do.)
- Make sure that you write a function that does nothing but sort an array. It should take the `int` array as an argument, but return nothing.

This class will be called `SelectionSort`.