BubbleSort, SelectSort and InsertSort in Excel & Delphi – Learning the Concepts in a Constructionist Way

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Abstract. A method is presented of acquiring the principles of three sorting algorithms through developing interactive applications in Excel.

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1   Introduction

In the workshop a method is presented of acquiring the principles of sorting algorithms SelectSort, InsertSort and BubbleSort through developing Excel applications. The author uses the method when teaching programming to undergraduates of Teaching informatics. The advantage of Excel is that the steps of the solution are on the screen, and the environment reacts immediately to the written formulas. Relative and absolute addressing is used only. The just acquired step of the solution is rewritten in Delphi or Lazarus (free at www.lazarus.freepascal.org). The application is in Fig. 1.
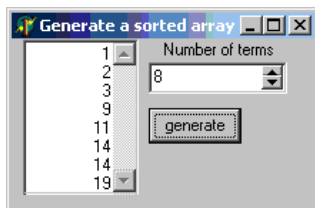

Fig. 1. The Delphi application

2   The applications

In BubbleSort (Fig. 2), each term of the array is compared with the next term. The terms are swapped if the first one is bigger than the second one.

In SelectSort (Fig. 3), maximum Max of the unsorted part of the array is found. Then it is swapped with the last term in the unsorted part. MaxI is the index of Max.

In InsertSort (Fig. 4), a number is inserted into a sorted array so that the array stays sorted. The method is convenient when the numbers are being generated.
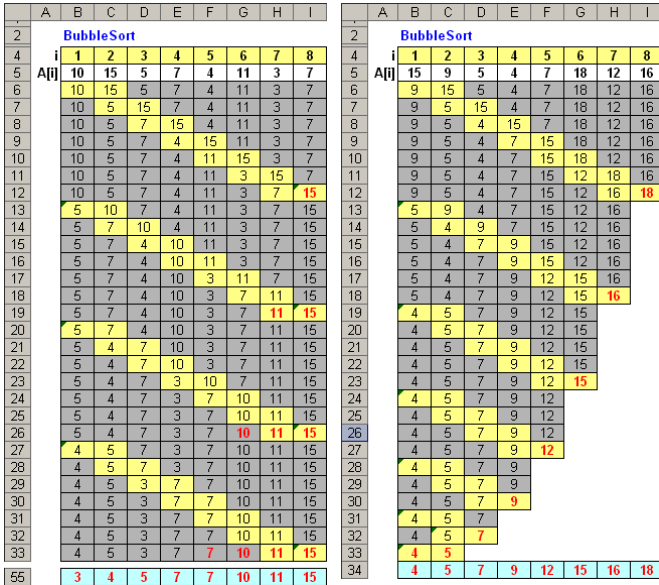
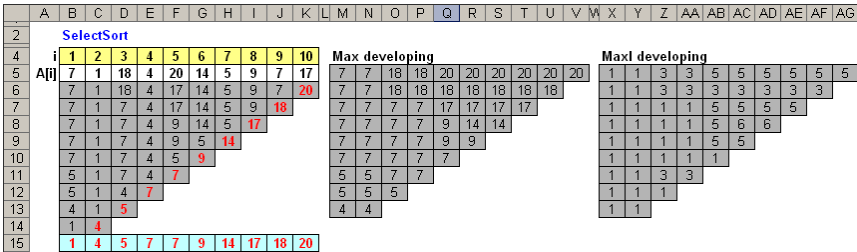**Fig. 2.** BubbleSort; the simpler (left) and the improved solution (right)
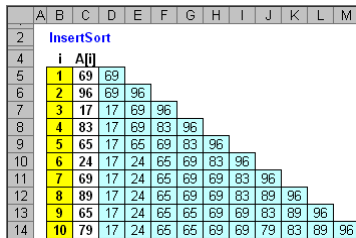
Fig. 3. SelectSort

Fig. 4. InsertSort