And now for something completely different . . .

Simple Sorts

Simple Sorts

1 Bubble Sort
2 Selection Sort

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1 Bubble Sort

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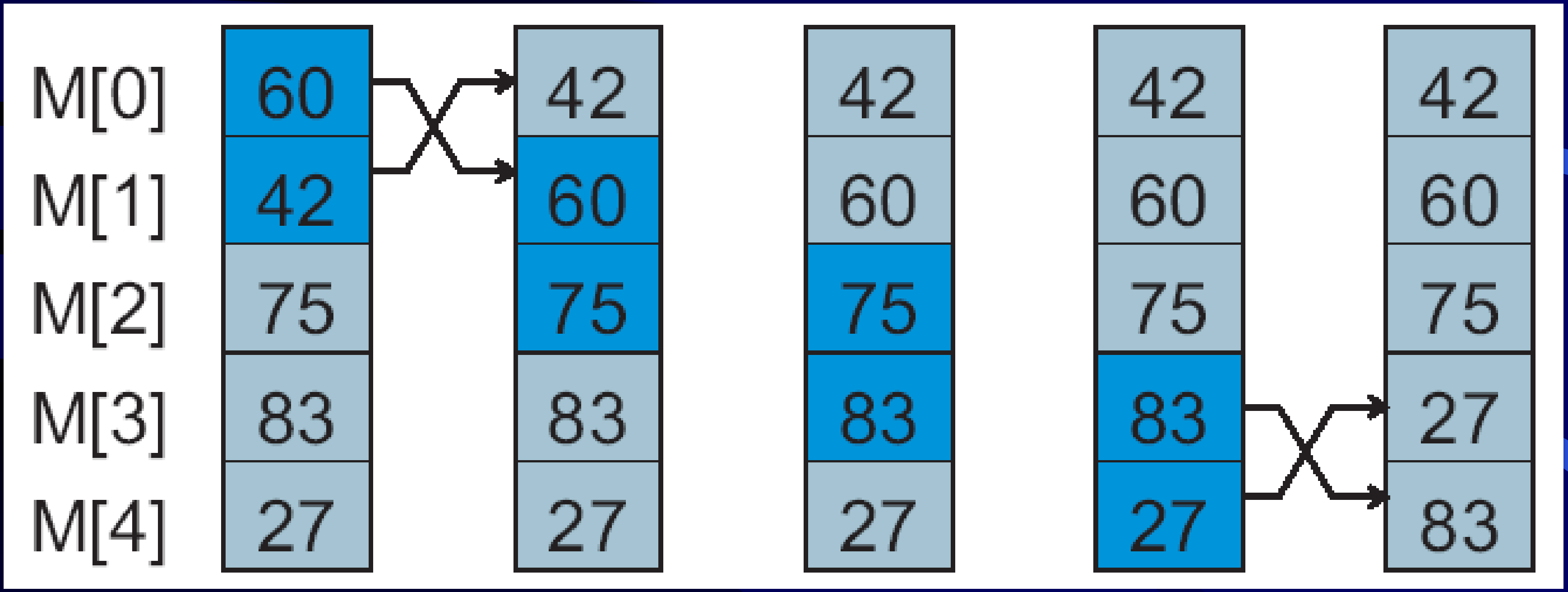
Bubble Sort: Example

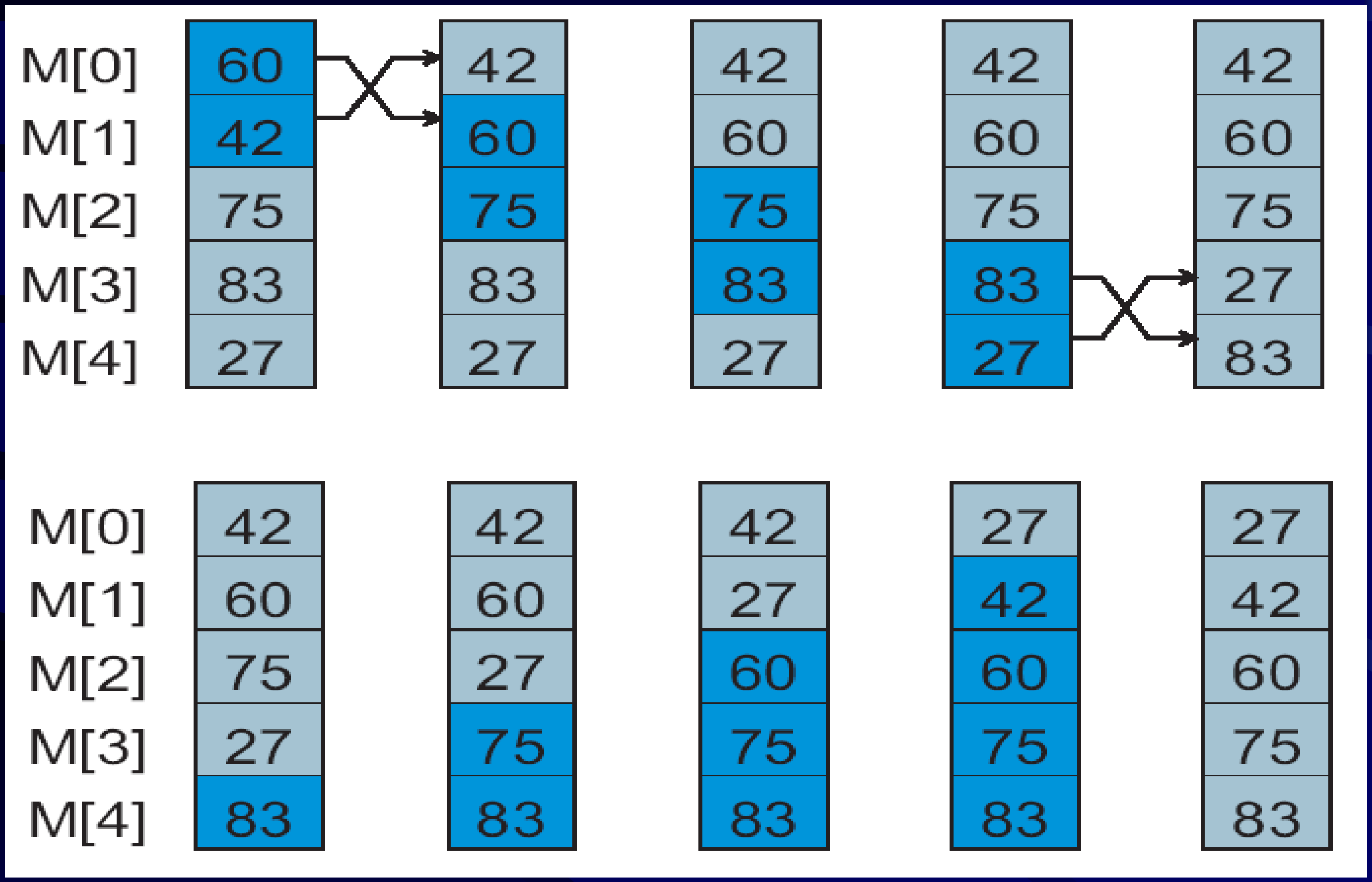
http://cs.armstrong.edu/liang/animation/web/BubbleSortNew.html



Bubble Sort: Example

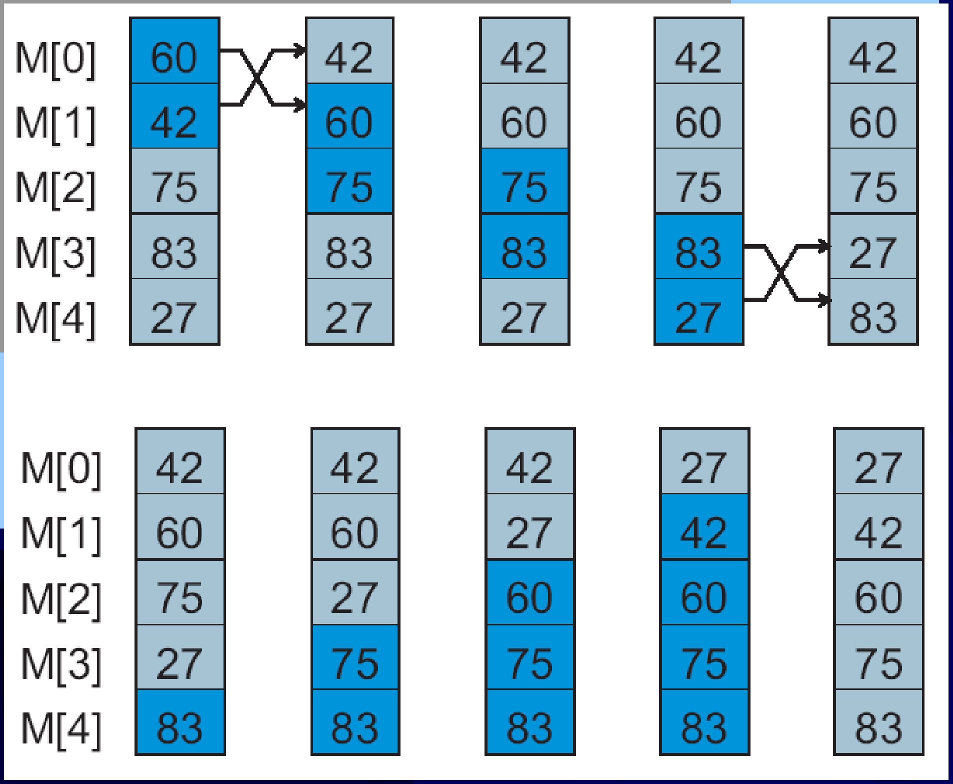
One Pass

List after completion of each pass



Bubble Sort: Algorithm

```
for pass = 1 ... n -1
    swap= false
    for position = 1 ... n - pass
    if element at position < element at position +1
    swap elements
    swap = true
    end if
    next position
    if swap = false break
next pass
```



Bubble Sort: Analysis

Number of comparisons (worst case):

$(n-1) + (n-2) + \ldots + 3 + 2 + 1 \rightarrow O(n^2)$

Number of comparisons (best case):

$n - 1 \rightarrow O(n)$

Number of swaps (worst case):

$(n-1) + (n-2) + \ldots + 3 + 2 + 1 \rightarrow O(n^2)$

Number of swaps (best case):

$0 \rightarrow O(1)$

Overall worst case: $O(n^2) + O(n^2) = O(n^2)$

A Bubblesort program

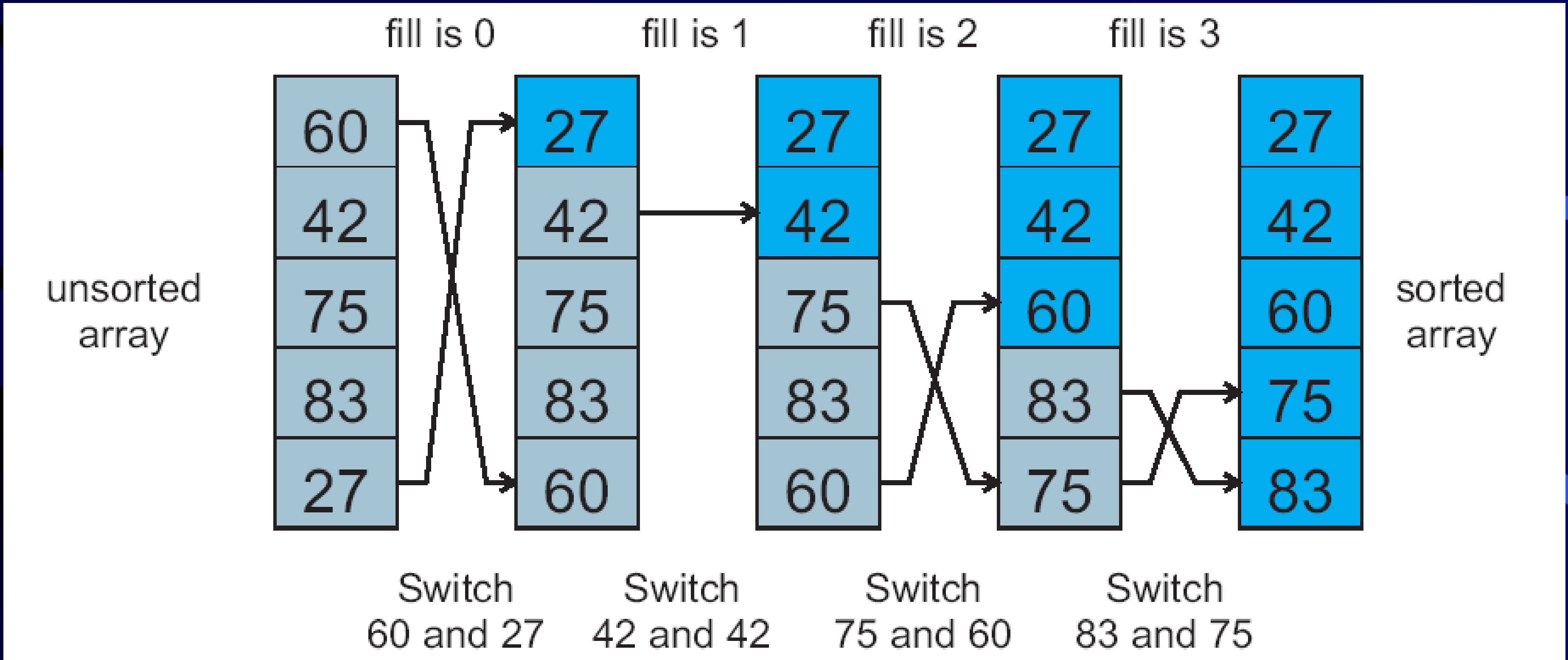
```
http://www.annedawson.net/bubblesort.py
```

Simple Sorts

1 Bubble Sort
2 Selection Sort

Selection Sort: Example

http://cs.armstrong.edu/liang/animation/web/SelectionSortNew.html



Selection Sort: Analysis

Number of comparisons:

$(n-1) + (n-2) + ... + 3 + 2 + 1 =$

$n * (n-1)/2 =$

$(n^2 - n)/2$

→ $O(n^2)$

Number of swaps (worst case):

$n – 1$

$O(n)$

Overall (worst case) $O(n) + O(n^2) = O(n^2)$ ('quadratic sort')

This presentation uses the following program file:

`http://www.annedawson.net/bubblesort.py`

`See all programs at:`

http://www.annedawson.net/Python3Programs.txt

End of Python_SimpleSorts.ppt

Last updated: Friday 23rd November 2017, 9:15 PT, AD