Programming Club Meeting 15 Slides

Bubble and Selection Sort

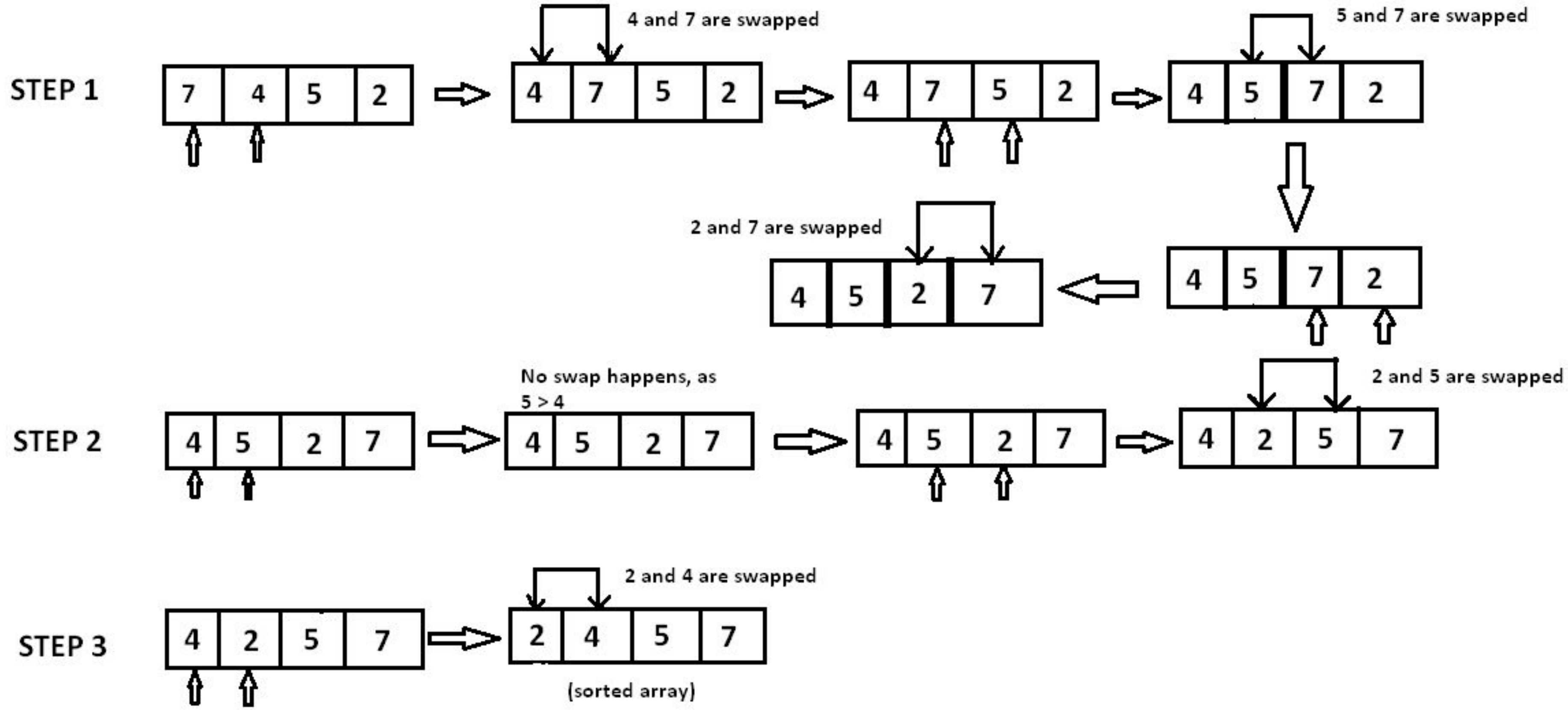
Quick Note

- Python’s built in sort method uses Tim Sort which is way quicker than anything you or I could write for most things, but learning how to works is helpful
- All sorting algorithms will work for all lists, but some are better than others depending on what exactly needs to be done

Bubble Sort

Bubble Sort

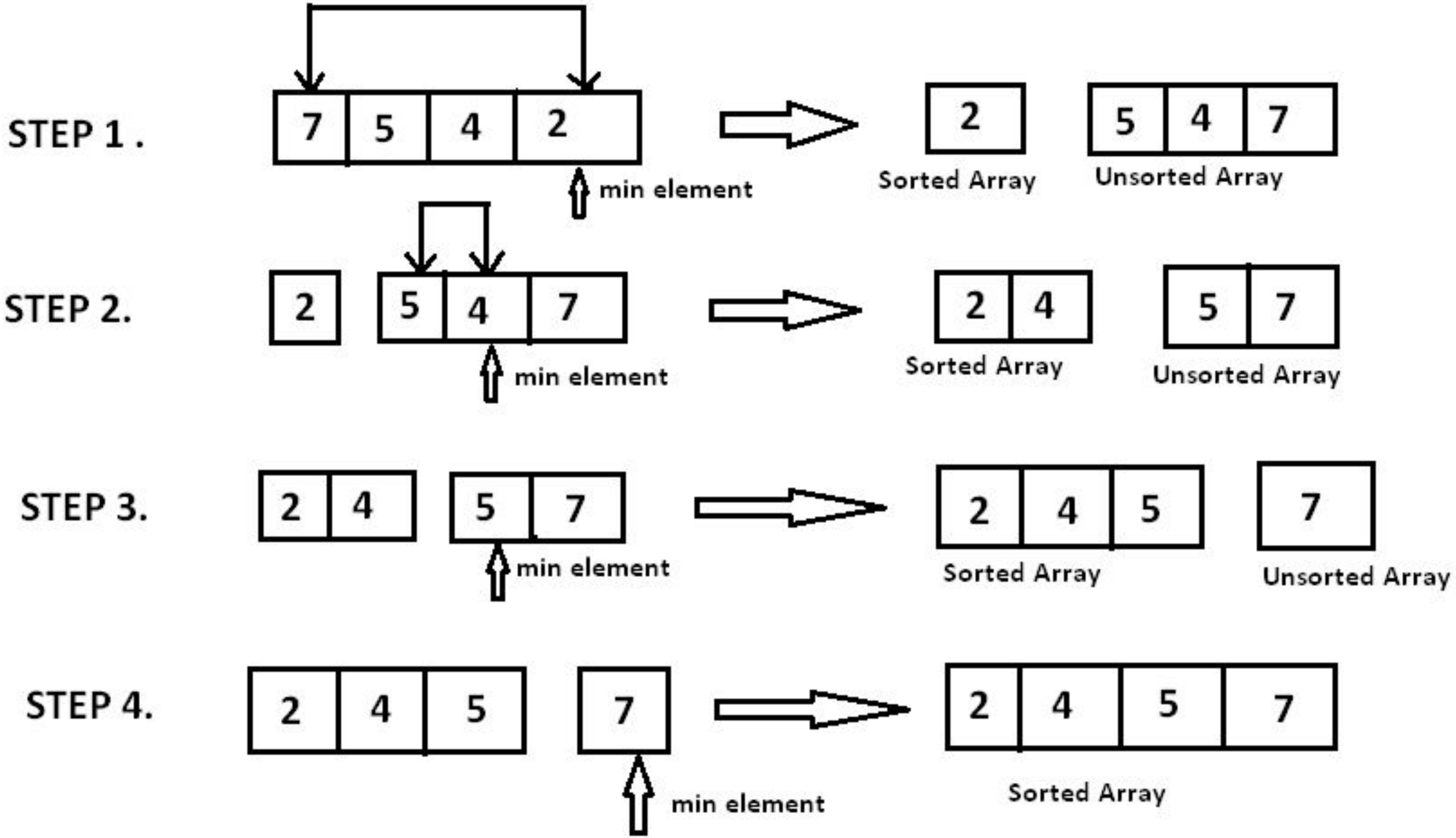
- Check the 1st and 2nd element, if they are out of order, swap them
- Do this for the 2nd and 3rd element
- Keep moving 1 forward and swapping out of place elements until you reach the end of the list
- Do this until the list is sorted
- Very easy method to implement, but fairly slow with long lists


STEP 1
7 4 5 2
4 7 5 2
4 and 7 are swapped
4 7 5 2
4 5 7 2
5 and 7 are swapped
4 5 7 2
4 5 2 7
2 and 7 are swapped
STEP 2
4 5 2 7
4 5 2 7
No swap happens, as
5 > 4
4 5 2 7
4 2 5 7
2 and 5 are swapped
STEP 3
4 2 5 7
2 4 5 7
2 and 4 are swapped
(sorted array)

Selection Sort

Selection Sort

- Go through each unsorted element in the list and find the one with the lowest value
- Swap this element with the first unsorted value (meaning that it is now sorted)
- Repeat this until the list is sorted
- Also quite easy to implement, still fairly slow with large lists
- Can also technically find the highest element and push it to the end, but typically the lowest is used



STEP 1 .

7 5 4 2

min element

2

Sorted Array

5 4 7

Unsorted Array

STEP 2.

2

5 4 7

min element

2 4

Sorted Array

5 7

Unsorted Array

STEP 3.

2 4

5 7

min element

2 4 5

Sorted Array

7

Unsorted Array

STEP 4.

2 4 5

7

min element

2 4 5 7

Sorted Array

Practice Problems

Practice Problem 1:

Implement Bubble Sort

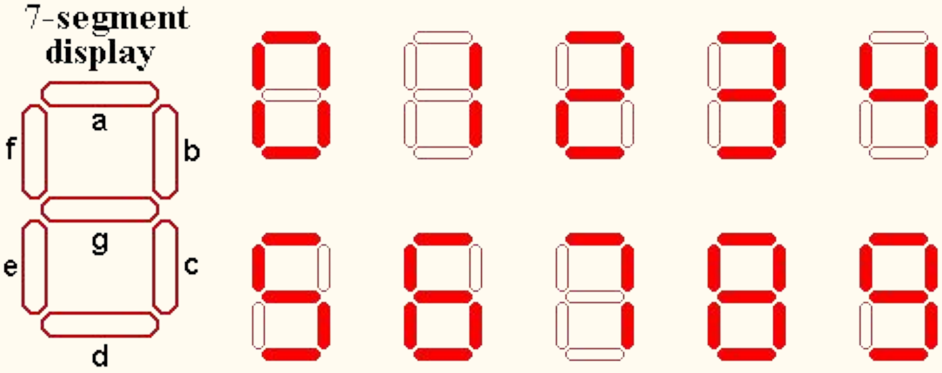
- Goal: Write a Python program that implements a bubble sort function.
- Relevant Information:
  - Ex Input: [5, 1, 4, 2, 8]
  - Want to go through the list swapping out of place elements until the list is sorted.

Practice Problem 2: Implement Selection Sort

- Goal: Write a Python program that implements a selection sort function.
- Relevant Information:
    - Ex Input: [64, 25, 12, 22, 11]
    - Want to go through the list swapping the lowest unsorted element with the first unsorted element until the list is sorted.

Practice Problem 3:

Matchstick Display



- Src: https://www.hackerearth.com/practice/basic-programming/input-output/basics-of-input-output/practice-problems/algorithm/seven-segment-display-nov-easy-e7f87ce0/
- Goal: Write a Python program that will output the largest value that can be created on a 7-segment display when each lit segment is represented by a matchstick. Note that the total number of matchsticks that can be used is limited and to be inputted by the user.
- Relevant Information:
  - Ex 1: Input: 2, Output: 1
  - Ex 2: Input 6, Output: 111
  - Ex 3: Input 11, Output: 71111

Next Meeting: Big O Notation