Implementing Selection Sort

Developing an Algorithm

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Step 1: Work an Instance

56 17 4 33

- Work small example: sort 56, 17, 4, 33

Step 1: Work an Instance

4 17 33 56

- Work small example: sort 56, 17, 4, 33

Step 2: Write Down What You Did

```
in  56  17  4  33

out
```

- Step 2: Write down what you did

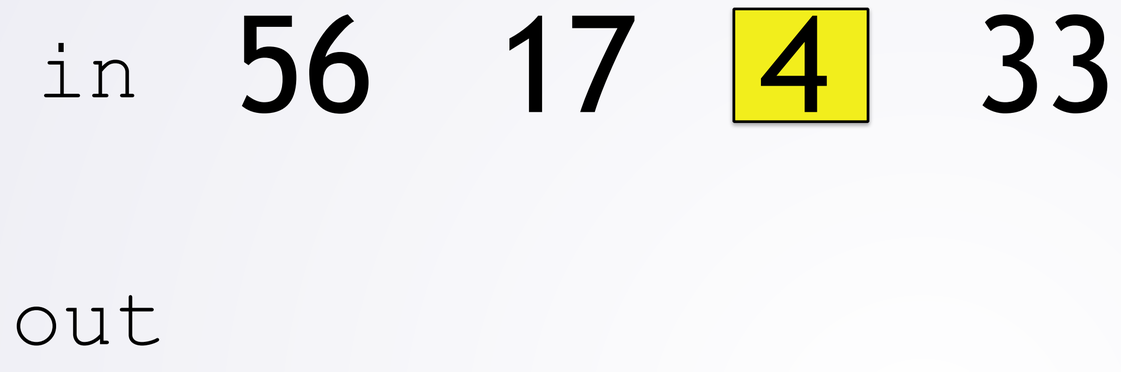
Step 2: Write Down What You Did

`in` 56 17 4 33

`out`

- Step 2: Write down what you did
  1. `out` **starts as empty** `ArrayList`

Step 2: Write Down What You Did



- Step 2: Write down what you did
  2. **Find smallest element in `in` (4)**

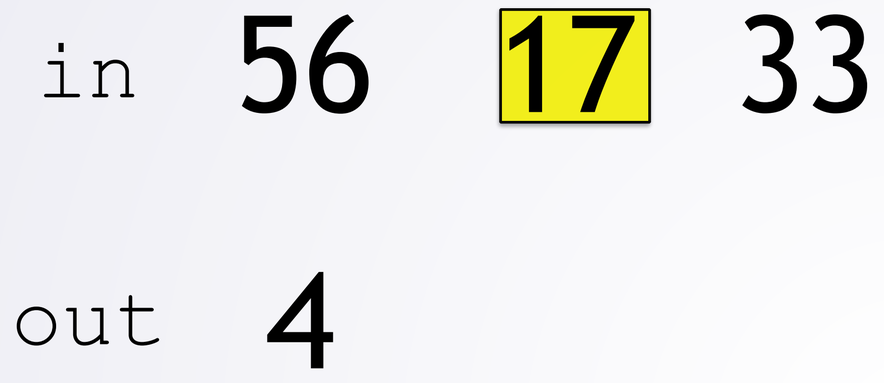
Step 2: Write Down What You Did

`in` 56 17 33

`out` 4

- Step 2: Write down what you did
  2. **Find smallest element in `in` (4)**
  3. **Remove 4 from `in`**
  4. **Add 4 to `out`**

Step 2: Write Down What You Did



- Step 2: Write down what you did
  5. **Find smallest element in `in` (17)**

Step 2: Write Down What You Did

`in` 56 33

`out` 4 17

- Step 2: Write down what you did
  5. **Find smallest element in `in` (17)**
  6. **Remove 17 from `in`**
  7. **Add 17 to `out`**

Step 2: Write Down What You Did

`in`	56	33
`out`	4	17

- Step 2: Write down what you did
  8. **Find smallest element in `in` (33)**

Step 2: Write Down What You Did

`in` 56

`out` 4 17 33

- Step 2: Write down what you did
  8. **Find smallest element in `in` (33)**
  9. **Remove 33 from `in`**
  10. **Add 33 to `out`**

Step 2: Write Down What You Did

`in` 56

`out` 4 17 33

- Step 2: Write down what you did
  1. **Find smallest element in `in` (56)**

Step 2: Write Down What You Did

`in`

`out` 4 17 33 56

- Step 2: Write down what you did
  11. **Find smallest element in `in` (56)**
  12. **Remove 56 from `in`**
  13. **Add 56 to `out`**

Step 2: Write Down What You Did

`in`

`out` 4 17 33 56

- Step 2: Write down what you did
  14. `out` **is the answer**

Step 2: Write Down What You Did

1. `out` **starts as empty** `ArrayList`
2. **Find smallest element in** `in` **(4)**
3. **Remove 4 from** `in`
4. **Add 4 to** `out`
5. **Find smallest element in** `in` **(17)**
6. **Remove 17 from** `in`
7. **Add 17 to** `out`
8. **Find smallest element in** `in` **(33)**
9. **Remove 33 from** `in`
10. **Add 33 to** `out`
11. **Find smallest element in** `in` **(56)**
12. **Remove 56 from** `in`
13. **Add 56 to** `out`
14. `out` **is the answer**

Step 3: Find Patterns, Generalize

1. `out` **starts as empty** `ArrayList`
2. **Find smallest element in** `in` **(4)**
3. **Remove 4 from** `in`
4. **Add 4 to** `out`
5. **Find smallest element in** `in` **(17)**
6. **Remove 17 from** `in`
7. **Add 17 to** `out`
8. **Find smallest element in** `in` **(33)**
9. **Remove 33 from** `in`
10. **Add 33 to** `out`
11. **Find smallest element in** `in` **(56)**
12. **Remove 56 from** `in`
13. **Add 56 to** `out`
14. `out` **is the answer**

Step 3: Find Patterns, Generalize

1. `out` starts as empty `ArrayList`
2. Find smallest element in `in` (4)
3. Remove 4 from `in`
4. Add 4 to `out`
5. Find smallest element in `in` (17)
6. Remove 17 from `in`
7. Add 17 to `out`
8. Find smallest element in `in` (33)
9. Remove 33 from `in`
10. Add 33 to `out`
11. Find smallest element in `in` (56)
12. Remove 56 from `in`
13. Add 56 to `out`
14. `out` is the answer

Step 3: Find Patterns, Generalize

1. `out` **starts as empty** `ArrayList`
2. **Find smallest element in** `in` **(4)**
3. **Remove 4 from** `in`
4. **Add 4 to** `out`
5. **Find smallest element in** `in` **(17)**
6. **Remove 17 from** `in`
7. **Add 17 to** `out`
8. **Find smallest element in** `in` **(33)**
9. **Remove 33 from** `in`
10. **Add 33 to** `out`
11. **Find smallest element in** `in` **(56)**
12. **Remove 56 from** `in`
13. **Add 56 to** `out`
14. `out` **is the answer**

Step 3: Find Patterns, Generalize

1. `out` starts as empty `ArrayList`
2. Find smallest element in `in` (4)
3. Remove 4 from `in`
4. Add 4 to `out`
5. Find smallest element in `in` (17)
6. Remove 17 from `in`
7. Add 17 to `out`
8. Find smallest element in `in` (33)
9. Remove 33 from `in`
10. Add 33 to `out`
11. Find smallest element in `in` (56)
12. Remove 56 from `in`
13. Add 56 to `out`
14. `out` is the answer

Step 3: Find Patterns, Generalize

1. `out` **starts as empty** `ArrayList`
2. **Find smallest element in** `in` **(**`minElement`**)**
3. **Remove** `minElement` **from** `in`
4. **Add** `minElement` **to** `out`
5. **Find smallest element in** `in` **(**`minElement`**)**
6. **Remove** `minElement` **from** `in`
7. **Add** `minElement` **to** `out`
8. **Find smallest element in** `in` **(**`minElement`**)**
9. **Remove** `minElement` **from** `in`
10. **Add** `minElement` **to** `out`
11. **Find smallest element in** `in` **(**`minElement`**)**
12. **Remove** `minElement` **from** `in`
13. **Add** `minElement` **to** `out`

11. `out` **is the answer**

Loop Until…?

```
in  56  17  4  33

out
```

- Not doing “for each element”
- How do you know when to stop?

Loop Until…?

`in`

`out` 4 17 33 56

- Not doing “for each element”
- How do you know when to stop?

Loop Until…?

`in` 

`out` 4 17 33 56

- Not doing “for each element”
- How do you know when to stop?
  - `in` is empty!

Step 3: Find Patterns, Generalize

1. `out` **starts as empty** `ArrayList`
2. **As long as** `in` **is not empty**
    a. **Find smallest element in** `in` **(**`minElement`**)**
    b. **Remove** `minElement` **from** `in`
    c. **Add** `minElement` **to** `out`
4. `out` **is the answer**

Step 3: Find Patterns, Generalize

1. `out` **starts as empty** `ArrayList`
2. **As long as** `in` **is not empty**
    a. **Find smallest element in** `in` **(**`minElement`**)**
    b. **Remove** `minElement` **from** `in`
    c. **Add** `minElement` **to** `out`
4. `out` **is the answer**

Step 4: Test Your Algorithm

1. `out` **starts as empty** `ArrayList`
2. **AS long as** `in` **is not empty**
    a. **Find smallest element in** `in` **(**`minElement`**)**
    b. **Remove** `minElement` **from** `in`
    c. **Add** `minElement` **to** `out`
4. `out` **is the answer**

Try for this input: 9 -3 0