Priority Queue

2018년 5월 20일 일요일   오후 1:06

- 우선순위가 있는 큐
- Key - Value Pair (KVP)

P.add(⑤,Ⓐ)   [(5,A)]
     value key

P.add(9,C)   [(5,A),(9,C)]
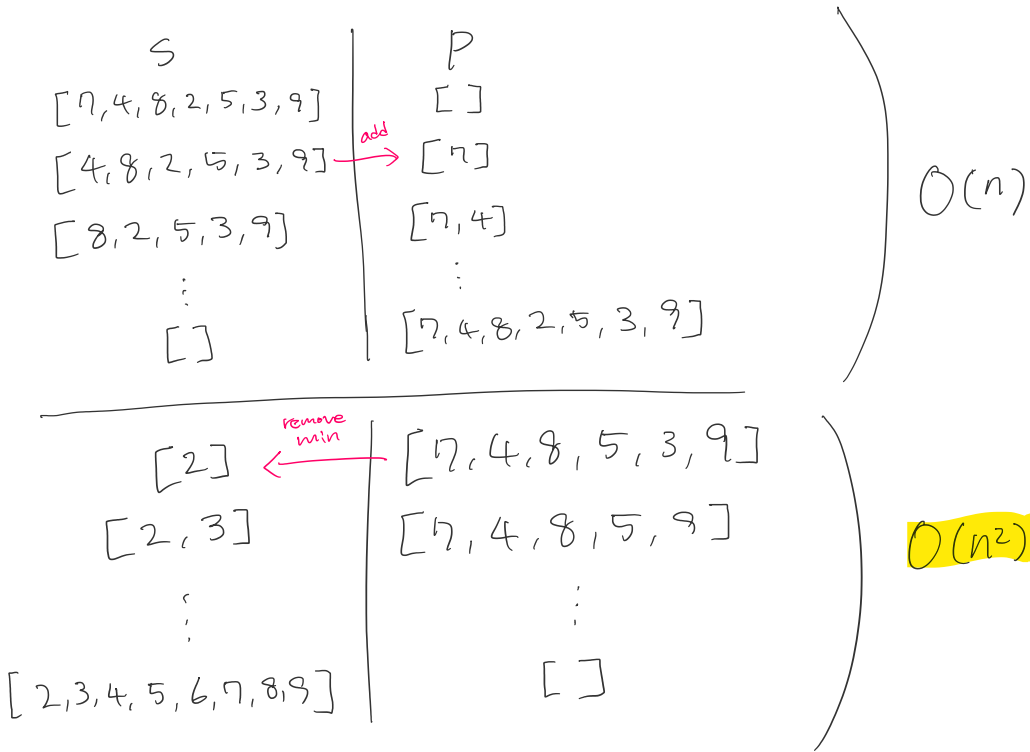
P.add(3,B)   [(5,A),(9,C),(3,B)]

• Sequence - Based Priority Queue

① Unsorted   ② Sorted

4 - 5 - 2 - 3 - 1   1 - 2 - 3 - 4 - 5

- add 할 때 $O(1)$ - add할 때 $O(n)$

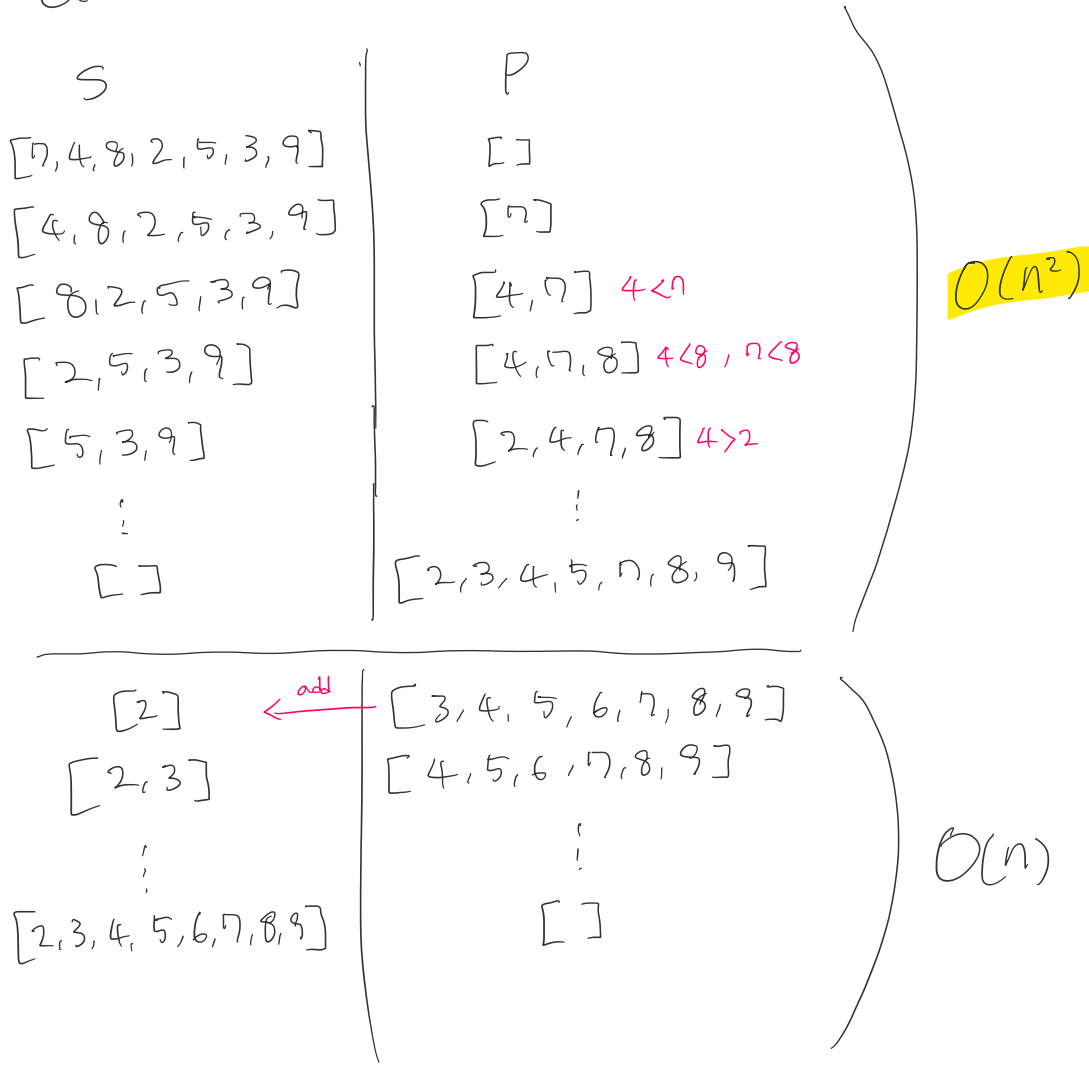- remove_min 할 때 $O(n)$ - remove_min할 때 $O(1)$

↓ Sorting

Value를 Key로 삼아 PQ에 add하고) unsorted: $O(n)$, sorted: $O(n^2)$

PQ가 빌 때까지 n번 remove-min 한다.) unsorted: $O(n^2)$, sorted: $O(n)$

• Selection Sort
- Unsorted로 implementation 한 Sorting하면 Selection Sort.
- $O(n^2)$

```
      S                        P
[7,4,8,2,5,3,9]              [ ]           ⎞
[4,8,2,5,3,9]  --add-->      [7]           │
[8,2,5,3,9]                  [7,4]         ⎬ O(n)
      ⋮                        ⋮            │
     [ ]                 [7,4,8,2,5,3,9]    ⎠
_____
     [2]   <--remove--  [7,4,8,5,3,9]       ⎞
     [2,3]      min      [7,4,8,5,9]         │
      ⋮                        ⋮            ⎬ O(n²)
[2,3,4,5,6,7,8,9]              [ ]           ⎠
```

• Insertion Sort
- Sorted로 implementation 한 Sorting하면 insertion sort.
- $O(n^2)$

```
      S                        P
[7,4,8,2,5,3,9]              [ ]               ⎞
[4,8,2,5,3,9]                [7]               │
[8,2,5,3,9]                  [4,7]   4<7       │
[2,5,3,9]                    [4,7,8] 4<8, 7<8  ⎬ O(n²)
[5,3,9]                      [2,4,7,8] 4>2     │
      ⋮                         ⋮             │
     [ ]                 [2,3,4,5,7,8,9]        ⎠
_____
     [2]   <--add--  [3,4,5,6,7,8,9]           ⎞
     [2,3]           [4,5,6,7,8,9]             ⎬ O(n)
      ⋮                    ⋮                   │
[2,3,4,5,6,7,8,9]         [ ]                   ⎠
```

• In-place Insertion Sort

⑤ - ④ - 2 - 3 - 1

④ - ⑤ - ② - 3 - 1

2 - 4 - 5 - ③ - 1

2 - 3 - 4 - 5 - ①

1 - 2 - 3 - 4 - 5