You

How could I do this question but with different data values e.g. 90, 41, 27, 19, 88, 64, 15, 36, 49, 58, 13
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Copilot

Got it! Let's tackle the question with the new data values: 90, 41, 27, 19, 88, 64, 15, 36, 49, 58, 13.

Selection Sort Using a Priority Queue (Unsorted Array)

Input Phase: Insert each key into the priority queue and record the state of the queue after each insertion.

Input	Priority Queue	Output
90	90	
41	90, 41	
27	90, 41, 27	
19	90, 41, 27, 19	
88	90, 41, 27, 19, 88	
64	90, 41, 27, 19, 88, 64	
15	90, 41, 27, 19, 88, 64, 15	
36	90, 41, 27, 19, 88, 64, 15, 36	
49	90, 41, 27, 19, 88, 64, 15, 36, 49	
58	90, 41, 27, 19, 88, 64, 15, 36, 49, 58	
13	90, 41, 27, 19, 88, 64, 15, 36, 49, 58, 13	

Output Phase: Extract the minimum key from the priority queue, record the output, and update the state of the queue after each extraction.

Input	Priority Queue	Output
	90, 41, 27, 19, 88, 64, 15, 36, 49, 58	13
	90, 41, 27, 19, 88, 64, 36, 49, 58	13, 15
	90, 41, 27, 88, 64, 36, 49, 58	13, 15, 19
	90, 41, 88, 64, 36, 49, 58	13, 15, 19, 27
	90, 88, 64, 36, 49, 58	13, 15, 19, 27, 36
	90, 88, 64, 49, 58	13, 15, 19, 27, 36, 41
	90, 88, 64, 58	13, 15, 19, 27, 36, 41, 49
	90, 88, 64	13, 15, 19, 27, 36, 41, 49, 58
	90, 88	13, 15, 19, 27, 36, 41, 49, 58, 64
	90	13, 15, 19, 27, 36, 41, 49, 58, 64, 88
		13, 15, 19, 27, 36, 41, 49, 58, 64, 88, 90

And there you have it! By following this method, you can sort any sequence of data values using selection sort and a priority queue implemented as an unsorted array. Let me know if you need more help or if there's something else you'd like to explore!

You

Extend the table of Exercise 1 by two additional columns: (a) the number of keys that have to be examined in order to select which to output
(b) the number of objects in the queue that have to be “shuffled up” when the selected object is output.

At the end of the table, enter the totals of each of those two columns.
What is the relation between the column total of number of examinations and the number of items in the input sequence?

Copilot

Sure thing! Let's extend the table with the additional columns.

Selection Sort Using a Priority Queue (Unsorted Array)

Input Phase: Insert each key into the priority queue and record the state of the queue after each insertion.

Output Phase: Extract the minimum key from the priority queue, record the output, and update the state of the queue after each extraction.

Extended Table:

Input	Priority Queue	Output	Examinations	Shuffle-Ups
	90, 41, 27, 19, 88, 64, 15, 36, 49, 58	13	11	0
	90, 41, 27, 19, 88, 64, 36, 49, 58	13, 15	10	1
	90, 41, 27, 88, 64, 36, 49, 58	13, 15, 19	9	2
	90, 41, 88, 64, 36, 49, 58	13, 15, 19, 27	8	3
	90, 88, 64, 36, 49, 58	13, 15, 19, 27, 36	7	4
	90, 88, 64, 49, 58	13, 15, 19, 27, 36, 41	6	5
	90, 88, 64, 58	13, 15, 19, 27, 36, 41, 49	5	6
	90, 88, 64	13, 15, 19, 27, 36, 41, 49, 58	4	7
	90, 88	13, 15, 19, 27, 36, 41, 49, 58, 64	3	8
	90	13, 15, 19, 27, 36, 41, 49, 58, 64, 88	2	9
		13, 15, 19, 27, 36, 41, 49, 58, 64, 88, 90	1	10
Total			**66**	**55**

Relation Between Examinations and Number of Items

The total number of examinations is the sum of the numbers of keys examined each time an output is selected. For an array of (n) items, it requires examining: [n, (n-1), (n-2), ..., 1] Thus, the total number of examinations (E) for an array of (n) items is: [E = n + (n-1) + (n-2) + ... + 1 = \frac{n(n+1)}{2}]

So, in this case, with 11 items, the total examinations (E) is: [E = \frac{11(11+1)}{2} = \frac{11 \times 12}{2} = 66]

This matches our table's total, confirming that the number of examinations is proportional to the sum of the first (n) natural numbers, which is quadratic in nature, specifically (O(n^2)).

Additional Explanation

- **Examinations:** Represents the number of items checked to find the minimum.
- **Shuffle-Ups:** Represents the number of items that need to be repositioned after removing the minimum.

Let me know if you need anything else!
