

85. Median of medians

AIM: To find the Median of medians by using divide and conquer method

PROGRAM:

```
def find_median_of_medians(arr, k):
    if len(arr) <= 5:
        arr.sort()
        return arr[k - 1]
    sublists = [arr[i:i+5] for i in range(0, len(arr), 5)]
    medians = [sorted(sublist)[len(sublist)//2] for sublist in sublists]
    pivot = find_median_of_medians(medians, len(medians)//2 + 1)
    left = [x for x in arr if x < pivot]
    right = [x for x in arr if x > pivot]
    pivot_count = len(arr) - len(left) - len(right)
    if k <= len(left):
        return find_median_of_medians(left, k)
    elif k > len(left) + pivot_count:
        return find_median_of_medians(right, k - len(left) - pivot_count)
    else:
        return pivot

arr = [3, 6, 8, 1, 2, 5, 7, 4]
k = 4
result = find_median_of_medians(arr, k)
print(f"The {k}-th smallest element is: {result}")
```

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The 4-th smallest element is: 4
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OUTPUT:

TIME COMPLEXITY: $O(n)$