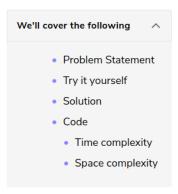
Minimum Difference Element (medium)



Problem Statement

Given an array of numbers sorted in ascending order, find the element in the array that has the minimum difference with the given 'key'.

Example 1:

```
Input: [4, 6, 10], key = 7
Output: 6
Explanation: The difference between the key '7' and '6' is minimum than any other number in th
e array
```

Example 2:

```
Input: [4, 6, 10], key = 4
Output: 4
```

Example 3:

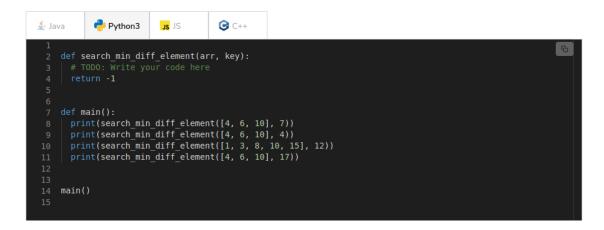
```
Input: [1, 3, 8, 10, 15], key = 12
Output: 10
```

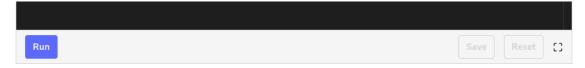
Example 4:

```
Input: [4, 6, 10], key = 17
Output: 10
```

Try it yourself

Try solving this question here:





Solution |

The problem follows the **Binary Search** pattern. Since Binary Search helps us find a number in a sorted array efficiently, we can use a modified version of the Binary Search to find the number that has the minimum difference with the given 'key'.

We can use a similar approach as discussed in Order-agnostic Binary Search. We will try to search for the 'key' in the given array. If we find the 'key' we will return it as the minimum difference number. If we can't find the 'key', (at the end of the loop) we can find the differences between the 'key' and the numbers pointed out by indices <code>start</code> and <code>end</code>, as these two numbers will be closest to the 'key'. The number that gives minimum difference will be our required number.

Code

Here is what our algorithm will look like:

```
🚣 Java
                                                              Python3
                                                                                                                                     ⊚ C++
                                             search_min_diff_element(arr, key):
                                  if key > arr[n - 1]:
                                           mid = start + (end - start) // 2
                                            if key < arr[mid]:</pre>
                                                      end = mid - 1
                                             elif key > arr[mid]:
                                                    return arr[mid]
                                  if (arr[start] - key) < (key - arr[end]):</pre>
 return arr
return arr
definition of the control of 
                                  return arr[end]
                               print(search_min_diff_element([4, 6, 10], 7))
                                 print(search_min_diff_element([4, 6, 10], 4))
                                 print(search_min_diff_element([1, 3, 8, 10, 15], 12))
                                print(search min diff element([4, 6, 10], 17))
                      main()
   Run
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          :3
```

Time complexity

Since, we are reducing the search range by half at every step, this means the time complexity of our algorithm will be O(log N) where 'N' is the total elements in the given array.

Space complexity

The algorithm runs in constant space O(1).



Search in a Sorted Infinite Array (medi...

Bitonic Array Maximum (easy)

✓ Completed

Next →

Propertian Issue Ask a Question