1) Given an array of [4,-2,5,3,10,5,2,8,-3,6,7,-4,1,9 -9,0,-6,8,11,9] integers find the maximum and minimum Product that can be obtained by multiply two integers from the array

Sol array is [4,-2,5,3,10,5,2,8,-3,6,7,-4,1,9,-1,9,0,-6,8,11,9]
we need to consider the target and smallest product that can be forword by selecting two consider from the array

1) Sort the array

Sorted array

[-9,-8,-6,-5,-4,-3,-2,0,1,2,3,4,5,6,7,8,9,10,11]

⇒ Identify possible condidates for maximum product

⇒ Identify posible condidates for minimum product

Calculating maximum product

* The two longest positive number are and 10x11 = 110
* The two smallest negative numbers are -9 and -8 = 72

the maximum product

calculating minimum product of-

The largest positive and negative number 11 and -9

~~HH~~ = 11x-9 = -99

The smallest positive and negative numbers are

-9x8 = -72

-99 is smaller than 7==0

maximum product = 110, and minimum product = -99

2) Demonstrate the priority search method to search for the key = 23 from the array = {2, 5, 8, 12, 16, 23, 38, 56, 72, 91}

Sol) given array = {2, 5, 8, 12, 16, 23, 38, 56, 72, 91}

1. Intalize Pointers

low = 0 and high = 9

calculate mid = $\left[\frac{low + high}{2}\right] = \frac{0+9}{2} = 4$

Compare arr[mid] with key:

arr[4] = 6

Since 16 < 23 updata low = mid + 1 = 5

calculate arr[mid] with key:

arr[7] = 56

Since 56 > 23 update high = mid - 1 = 6

mid = $\left[\frac{5+6}{2}\right] = 5$

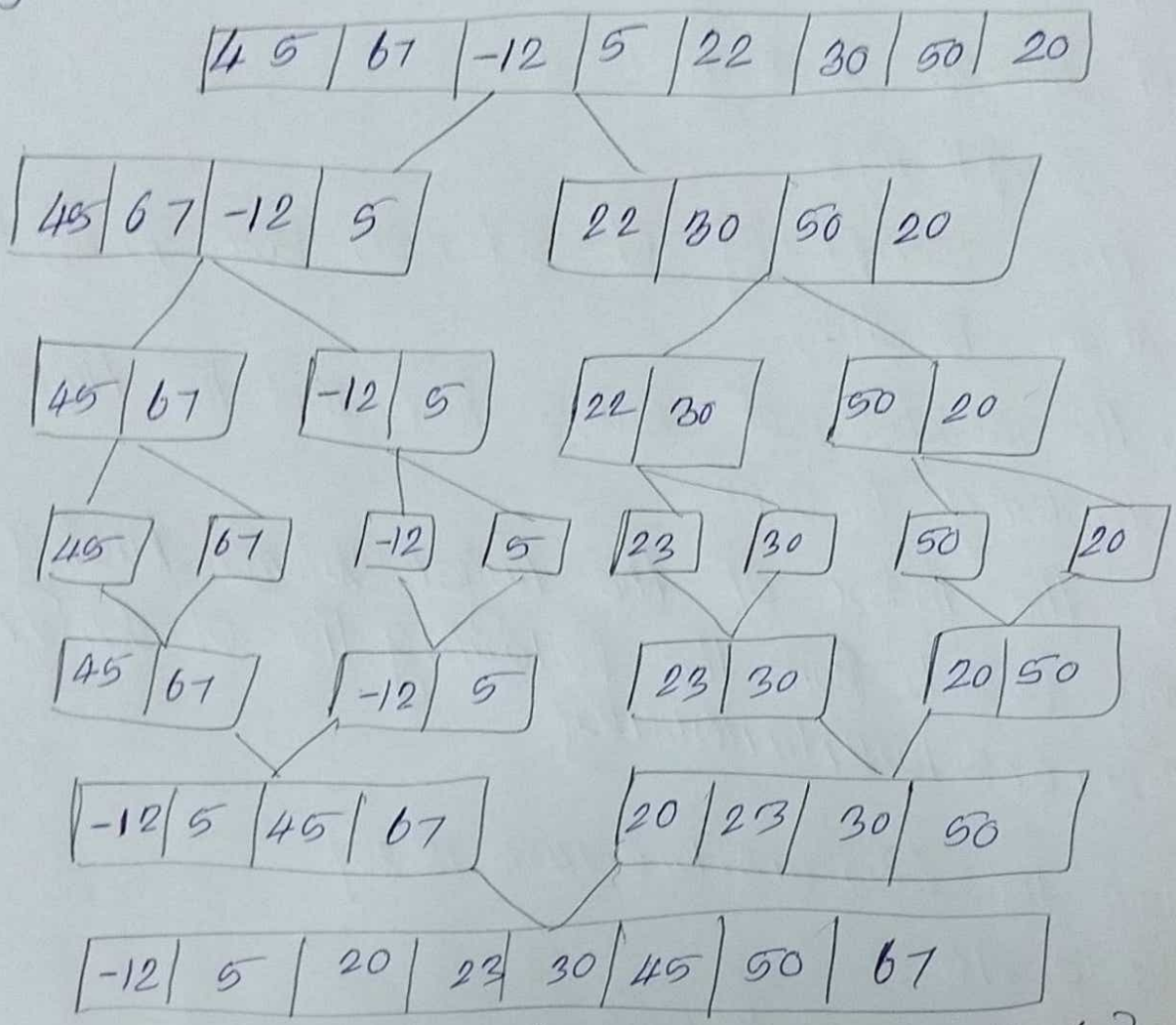
arr[mid] = arr[5] = 23

23 = 23 The is found at index = 5

∴ The key = 23 is found at index 5

3) Apply merge sort and other list of 8 elements, Data d = {4, 5, 6, 7, -12, 5, 22, 30, 50, 20). Set up a recursive relation for the number of key comparisions made by merge sort

merge sort



∴ The sorted list = (-12, 5, 20, 23, 30, 45, 50, 67)

4) Find the no. of times to perform solving swapping for selection sort also estimate the time complexity for the order of notation set S(12, 7, 5, -2, 8, 6, 13, 4)

The selection sort algorithm always makes exactly n-1 swaps in the worst case, where n is the no. of element in the list

given S = {12, 7, 5, -2, 8, 6, 13, 4}

No. of Element, n = 8

No. of swaps n = 8 n = 1, = 7

Time complexity :-

The time complexity of selection sort in Big-O notation is O(n2)

So, the numbers of swaps is 7, and the time complexity is O(n2)

5) Find the index of the target volume using binary search from the following list of elements [2,4,6,8,10,12,14,16,18,20]

Given list = [2,4,6,8,10,12,14,16,18,20]

Value = 10

Low = 0 and high = 9

$mid = \frac{low + high}{2} = \frac{0+9}{2} = 4$

Ex:- List(4) mid = 10, mid = value

Since 10 == 10 the target is found at index

∴ the largest value = 10 is found at index 4