Assignment - 12 (22-6-24)

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

Solution

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

1) Sort the array.
2) Identify Possible Candidates for maximum Product
3) Identify Possible Candidates for minimum Product

Calcating maximum Product.

The two largest Positive numbers are 10 and 11

10 X 11 = 110

The two smallest negative numbers are -9 and -8

-9 X -8 = 72

The maximum Product is 110

The largest Positive and negative number is 11 or -9

11 X -9 = -99

The smallest Positive negative number are

-9 X -8 = 72

99 is smaller than 72 so

Maximum Product = 110 and minimum Product = -99

2.

Demonstrate the Binary Search method to search for the y = 23 from the array = {8, 5, 8, 12, 16, 23, 38, 58, 72, 91}

Given Key = 23 and array = {2, 5, 8, 12, 16, 23, 28, 5, 6, 72, 91}

1) Initialize pointers

low = 0 and high = 9

mid = $\left[\frac{low + high}{2}\right]$ = 0 $\left[\frac{6+4}{2}\right]$ = 5

Compare arr[mid] with key

arr[4] = 16

16 < 23 low = mid + 1 = 5

mid = $\left(\frac{low + high}{2}\right)$ = $\left[\frac{5+4}{2}\right]$ = 7

compare arr[mid] with key

arr[7] = 56

56 > 23 update high

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

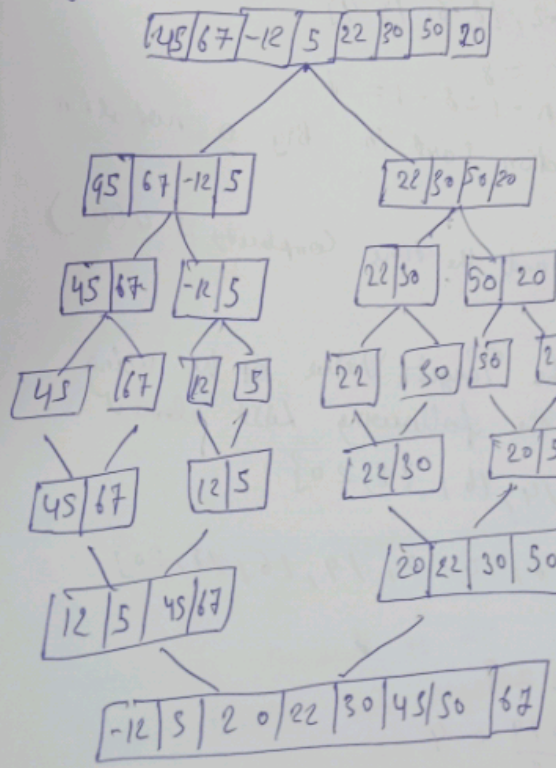
arr[mid] = arr[5] = 23

23 == 23

Key = 23 Index = 5

Apply merge sort and other list of 8 elements
Data = { 45, 67, 12, 5, 22, 30, 50, 20} set up a recurrence relation for the number of key comparisons made by merge sort

Merge Sort



4. Find the worst times to perform sorting using Selection sort also estimate the time complexity for order of notation set (12, 7, 5, -2, 18, 6, 13, 4)

Solution

$S = \{12, 7, 5, -2, 18, 6, 13, 4\}$

No. of elements $n = 8$

No. of swaps $= n - 1 = 8 - 1 = 7$

Time Complexity: Selection sort in Big O notation $O(n^2)$

number of swaps 7 and the time complexity is $O(n^2)$

5. Find the index of the Target Value 10 using binary search from the following List element

$\{2, 4, 6, 8, 10, 2, 14, 16, 18, 20\}$

given List $= \{2, 4, 6, 8, 10, 2, 14, 16, 18, 20\}$

value $= 10$

low $= 0$ and high $= 9$

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

mid $= 10$ mid $==$ value

$10 == 10$

The target is found at index 4.

Value $= 10$ is found at index 4