Practice assisted project phase 1

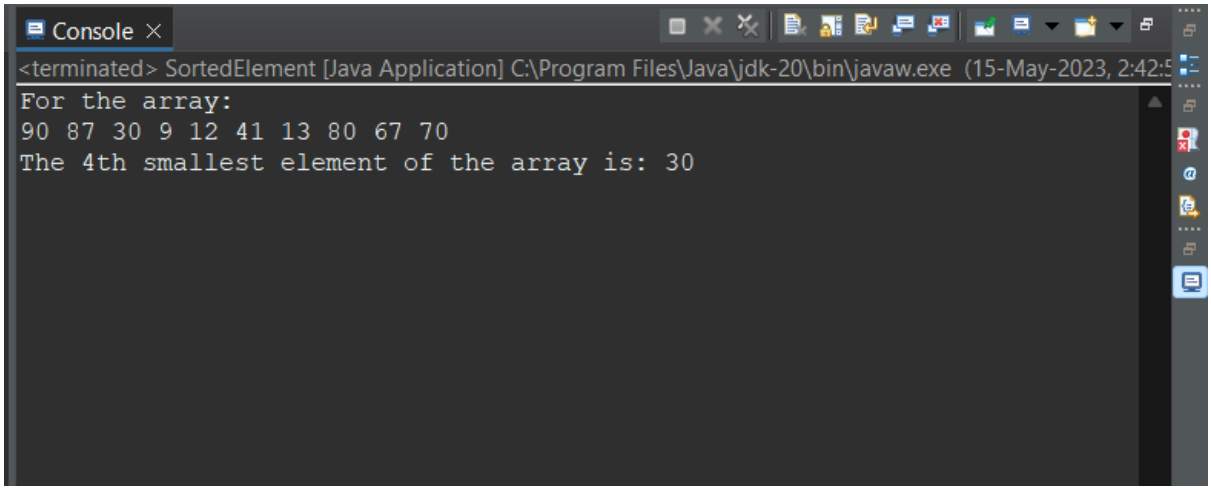
1. Write a program in Java to find the fourth smallest element in an unsorted list :

```
package main;

public class SortedElement {
    class MinimumHeap
    {
        int[] h;
        int c;

            int heapSize;
            int parent(int j)
            {
                return (j - 1) / 2;
            }

            int left(int j)
            {
                return ((2 * j ) + 1);

            }
            int right(int j)
            {
                return ((2 * j ) + 2);

            }
            int getMin()
            {
                return h[0 ];

            }
            void replaceMax(int y)
            {
                this.h[0 ] = y;
                heapify(0 );
            }

            MinimumHeap(int arr[], int s)
            {
                heapSize = s;
```

```
40.                 h = arr;
41.                 int j = (heapSize - 1 ) / 2;
42.                 while (j >= 0)
43.                 {
44.                     heapify(j );
45.                     j = j - 1;
46.                 }
47.             }
48.             int extractMin()
49.             {
50.                 if (heapSize == 0)
51.                 {
52.                     return Integer.MAX_VALUE;
53.                 }
54.                 int r = h[0];
55.                 if (heapSize > 1)
56.                 {
57.                     h[0] = h[heapSize - 1];
58.                     heapify(0);
59.                 }
60.                 heapSize = heapSize - 1;
61.                 return r;
62.             }
63.             void heapify(int j)
64.             {
65.                 int lt = left(j);
66.                 int rt = right(j);
67.                 int minimum = j;
68.                 if (lt < heapSize && h[lt] <
  h[j])
69.                 {
70.                     minimum = lt;
71.                 }
72.                 if (rt < heapSize && h[rt ] <
  h[minimum ] )
73.                 {
74.                     minimum = rt;
75.                 }
76.                 if (minimum != j )
77.                 {
78.                     int t = h[j ];
79.                     h[j] = h[minimum ];
80.                     h[minimum ] = t;
81.                     heapify(minimum );
```

```
                    }
                }
        };
        public int findKthSmallest(int a[], int
  s, int k)
        {
            MinimumHeap mHeap = new
  MinimumHeap(a, s );

            for (int j = 0; j < k - 1; j++)
            {
                mHeap.extractMin();
            }

            return mHeap.getMin();
        }
        public static void main(String[] args)
        {
            SortedElement obj = new
  SortedElement();

            int arr1[] = {90, 87, 30, 9, 12, 41,
  13, 80, 67, 70 };

            int size = arr1.length;
            int k = 4;

            System.out.println("For the array:
  ");
            for(int i = 0; i < size; i++)
            {
                System.out.print(arr1[i] + " ");
            }

            int ele = obj.findKthSmallest(arr1,
  size, k);

            System.out.println();
            System.out.println("The " + k + "th
  smallest element of the array is: " + ele);

        }

    }
```

OUTPUT-


Console
<terminated> SortedElement [Java Application] C:\Program Files\Java\jdk-20\bin\javaw.exe (15-May-2023, 2:42:5
For the array:
90 87 30 9 12 41 13 80 67 70
The 4th smallest element of the array is: 30