Name: Patil Krushna Gopal

Roll no.: 38

//Write a program for sorting from given array in ascending / descending order

// n = 1000, 2000, 300 find the exact time of execution.

#include<iostream>

#include<conio.h>

#include<chrono>

using namespace std;

using namespace std::chrono;

class HeapSort

{

public:

    int done, maxchild, temp;

    int A[1000];

    int i, n;

    void shiftdown(int[], int, int);

    void heapsort(int[], int);

    void getdata();

    void display();

};

void HeapSort::getdata()

{

    cout << "Enter size of array:";

    cin >> n;

    cout << "Enter the array elements=";

    for (int i = 0; i < n; i++)

    {

        cin >> A[i];

    }

}

void HeapSort::shiftdown(int A[], int root, int bottom)

{

    done = 0;

    while ((root \* 2 + 1 <= bottom) && (!done))

    {

        if (root \* 2 + 1 == bottom || A[root \* 2 + 1] > A[root \* 2 + 2])

        {

            maxchild = root \* 2 + 1;

        }

        else

        {

            maxchild = root \* 2 + 2;

        }

        if (A[root] < A[maxchild])

        {

            temp = A[root];

            A[root] = A[maxchild];

            A[maxchild] = temp;

            root = maxchild;

        }

        else

        {

            done = 1;

        }

    }

}

void HeapSort::heapsort(int A[], int ub)

{

    for (int i = (ub / 2.0) - 1; i >= 0; i--)

    {

        shiftdown(A, i, ub);

    }

    for (int i = ub; i >= 1; i--)

    {

        temp = A[0];

        A[0] = A[i];

        A[i] = temp;

        shiftdown(A, 0, i - 1);

    }

}

void HeapSort::display()

{

    cout << "Elements you entered:";

    for (int i = 0; i < n; i++)

    {

        cout << A[i] << " ";

    }

    heapsort(A, n - 1);

    cout << "\nSorted element  in ascending order:";

    for (int i = 0; i < n; i++)

    {

        cout << A[i] << " ";

    }

    cout << endl;

    cout << "\nSorted element  in descending order:";

    for (int i = n; i >= 0; i--)

    {

        cout << A[i] << " ";

    }

    cout << endl;

}

int main()

{

    HeapSort h;

    h.getdata();

    auto start = high\_resolution\_clock::now();

    h.display();

    auto stop = high\_resolution\_clock::now();

    auto duration = duration\_cast<seconds>(stop - start);

    cout << "\n Exact time of execution:" << duration.count() << "seconds\n" << endl;

}

Output:

Enter size of array:5

Enter the array elements=34

54

23

78

99

Elements you entered:34 54 23 78 99

Sorted element in ascending order:23 34 54 78 99

Sorted element in descending order: 99 78 54 34 23

Exact time of execution:0seconds