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Title: Assignment 2

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Hamza Mehmood

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**National University of Modern Languages**

DATA STRUCTURES & ALGORITHMS

**Subject:** Data Structures and Algorithms **Instructor:** Mohsin Abbas

**Lab Assignment:** 2 **Due Date:** 11-03-2022

**Class:** BSSE III (Eve)

**Student Roll No:SP-21-110**  **Student Name:Hamza Mehmood**

**Total Marks:** 20 **Obtained Marks:**

**Note: This assignment will be evaluated on the basis of comments and paper work. Therefore, comments must be logical (should explain logic not the syntax only) and all comments must be in your own words. It is an individual assignment. Every Student has to submit one file (.docx file). The .docx file must contain this page as the first page and along with the code of function with comments.**

**Assigned Task:**

1. Write a program that implements simple arrays 1-D but as per choice of user and implement all 3 sorting algorithms(bubble-insertion-selection). Take size and all values from user and provide proper menu which helps user to understand the flow of program. Attach screenshot(s) of proper result and working of program. (10 marks)

SOLUTION

// Authors:-Hamza Mehmood(SP-21-110).

// Program Title:-Assignment # 2

// Preprocessor Directive Section

#include <iostream>

// Standard Allocation

using namespace std;

void Intro() // Function For Introduction

{

    cout << "\t\t    /\\/\\/\\/\\/\\/\\/\\/\\/\\/\\/\\/\\/\\/\\/\\/\\/\\/\\/\\/\\/\\\n"

         << endl;

    cout << "\t\t      National University of Modern Languages \n"

         << endl;

    cout << "\t\t    \t Software Engineering Department \n"

         << endl;

    cout << "\t\t  \t  Instructor:- Prof.Mohsin Abbas \n"

         << endl;

    cout << "\t\t\t\t--Assignment # 2--    \n"

         << endl;

    cout << "------------------------------------------------------------------------------\n"

         << endl;

    cout << "\t\t |Name| = Hamza Mehmood(SP-21-110)\n "

         << endl;

    cout << "\t\t      |Roll #| = SP-21-110\n "

         << endl;

    cout << " \\\*\\\*\\\*\\\*\\\*\\\*\\\*\\\*\\\*\\\*\\\*\\\*\\\*\\\*\\\*\\\*\\\*\\\*/\*/\*/\*/\*/\*/\*/\*/\*/\*/\*/\*/\*/\*/\*/\*/\*/\*/\*/\*/\*/\*/\n"

         << endl;

}

// Selection Sort

void selectionsort(int arr[], int size) // Creating Function

{

    int temp, min;                                 // Declaring Temperory Variable for Swapping Purpose and Min Variable for Setting Initial Sorted Array Value

    for (int outer = 0; outer < size - 1; outer++) // Outer Loop For Implementing Each Pass

    {

        // Finding min Value in Unsorted Array

        min = outer;

        for (int inner = outer + 1; inner < size; inner++)

        {

            if (arr[min] > arr[inner])

            {

                min = inner;

            }

        } // Swapping and Placing in Correct Position

        temp = arr[outer];

        arr[outer] = arr[min];

        arr[min] = temp;

    }

}

//Main Method

int main()

{

    Intro();

    cout << "\n\n";

    cout << "Question 1. Write a program that implements simple array 1-D using all three sorting Algorithm.Take Size and all vales from user.";

    cout << "\n\n";

    cout << "Press 1 for Bubble Sort\nPress 2 for Selection Sort\nPress 3 for Insertion Sort\n";

int choice;

    cout<<"Your Pick = ";

    cin >> choice;

    cout << "\n\n";

    if (choice == 1)

     {

         //Bubble Sort

int size,temp,arr[500];

    cout << "Enter size Of array = ";

    cin>>size;

        cout << "\n\n";

        for (int i = 0; i < size; i++) // Implementing Loop

        {

            cout << "Enter Value at " << i << " index = ";

            cin >> arr[i]; // Getting Values One By One

        }

            cout << "\nUnsorted Array is as Follow:\n";

        for (int j = 0; j < size; j++) // Implementing Loop

        {

            cout<<arr[j]<<"\t";

        }

    for (int outer = 0; outer < size - 1; outer++) // Outer Loop For Implementing Each Pass

    {

        for (int inner = 0; inner < size - outer - 1; inner++) // Inner Loop for Implementing and Comparing the Desired Condition on Each Pass

        {

            if (arr[inner] > arr[inner + 1]) // Declaring Condition and comparing Two Adjacent Array Elements

            {

                // Swapping Elements if Array Elements are not in sorted Order

                temp = arr[inner]; //

                arr[inner] = arr[inner + 1];

                arr[inner + 1] = temp;

            }

        }

    }

    cout << "\n\n";

        cout << "Sorted values are as follows:" << endl;

        for (int k = 0; k < size; k++)

        {

            cout << arr[k] << "\t";

        }

    }

    else if (choice == 2)

    {

        // selection sort

        int size;

        int values;

        int arr[values];

        cout << "Enter size Of array = ";

        cin >> size;

        cout << "\n\n";

        for (int i = 0; i < size; i++) // Implementing Loop

        {

            cout << "Enter Value at " << i << " index = ";

            cin >> arr[i]; // Getting Values One By One

        }

            cout << "\nUnsorted Array is as Follow:\n";

        for (int j = 0; j < size; j++) // Implementing Loop

        {

            cout<<arr[j]<<"\t";

        }

        cout << "\n\n";

        selectionsort(arr, size);

        cout << "Sorted values are as follows:" << endl;

        for (int k = 0; k < size; k++)

        {

            cout << arr[k] << "\t";

        }

    }

    else if (choice == 3)

    {

        //Insertion sort

    int temp,size,arr[500];

    cout << "Enter size Of array = ";

    cin>>size;

        cout << "\n\n";

        for (int i = 0; i < size; i++) // Implementing Loop

        {

            cout << "Enter Value at " << i << " index = ";

            cin >> arr[i]; // Getting Values One By One

        }

            cout << "\nUnsorted Array is as Follow:\n";

        for (int j = 0; j < size; j++) // Implementing Loop

        {

            cout<<arr[j]<<"\t";

        }

    for (int outer = 1; outer < size; outer++)

    {

        temp = arr[outer];

        int inner = outer;

        // Comparing with each element on the left of it until the element smaller then it is found

        while (inner > 0 && arr[inner - 1] >= temp)

        {

            arr[inner] = arr[inner - 1];

            inner--;

        }

        arr[inner] = temp;

    }

        cout << "\n\n";

        cout << "Sorted values are as follows:" << endl;

        for (int k = 0; k < size; k++)

        {

            cout << arr[k] << "\t";

        }

    }

    else

    {

        cout<<"Wrong Pick";

    }

    return 0;

}

Screenshots

