Bahria University,

Karachi Campus



Course: CSL 221 – Data Structure & Algorithms

Term: Fall 2021, Class: BSE- 3(B)

Submitted By:

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Signed Remarks: Score:

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LAB EXPERIMENT NO.

**01**

LIST OF TASKS

|  |  |
| --- | --- |
| TASK NO | OBJECTIVE |
| 01 | Create an array of length 10 of integers. Values ranging from 1 to 50.  1. Find all pair of elements whose sum is 25.  2. Find the number of elements of A which are even, and the number of elements of A which are odd. 3. Write a procedure which finds the average of the value of A. |
| 02 | Write a program which input 2 matrix of user defined rows and columns and perform following operation  a. Display/Print as a Matrix  b. Addition of Matrix  c. Subtraction of Matrix  d. matrix multiplication  e. Determinant  f. Inverse |
|  |  |

Submitted On:

**28-10-2021**

(Date: DD/MM/YY)

Task 1: **Create an array of length 10 of integers. Values ranging from 1 to 50.**

**1. Find all pair of elements whose sum is 25.**

**2. Find the number of elements of A which are even, and the number of elements of A which are odd.  
 3. Write a procedure which finds the average of the value of A.**

Solution:

1: **Find all pair of elements whose sum is 25.**

**Code:**

static void Main(string[] args)

{

int i, j, z;

int[] arr1 = { 5, 20, 15, 4, 12, 13, 10, 14, 5, 10 };

for (i = 0; i < 10; i++)

{

for (j = i + 1; j < 10; j++)

{

// z = arr1[i] + arr1[j];

if (arr1[i] + arr1[j] == 25)

{

Console.WriteLine("Sum : " + arr1[i] + " " + arr1[j] + " = " + (arr1[i] + arr1[j]) + " Index = " + i + " " + j);

}

}

}

Console.ReadLine();

}

Output:

Text

Description automatically generated

**2. Find the number of elements of A which are even, and the number of elements of A which are odd.  
Code:**

int[] arr1 = { 5, 20, 15, 4, 12, 13, 10, 14, 5, 10 };

for (int i = 0; i < 10; i++)

{

if (arr1[i] % 2 == 0)

{

Console.WriteLine("Even: " + arr1[i] + " " + " Index=" + i);

}

else

{

Console.WriteLine("\nOdd: " + arr1[i] + " " + " Index=" + i);

}

}

Console.ReadKey(); **Output:**

Text

Description automatically generated **3. Write a procedure which finds the average of the value of A.**

**Code:**

int[] arr1 = { 5, 20, 15, 4, 12, 13, 10, 14, 5, 10 };

double sum = 0;

for (int i = 0; i < 10; i++)

{

sum += arr1[i];

}

Console.WriteLine("Sum = " + sum);

double result = sum / 10;

Console.WriteLine("Average = " + result);

Console.ReadKey(); **Output:**



Task 2: **Write a program which input 2 matrix of user defined rows and columns and perform following operation**

**a. Display/Print as a Matrix**

**b. Addition of Matrix**

**c. Subtraction of Matrix**

**d. matrix multiplication**

**e. Determinant**

**f. Inverse**

Solution:

static void Main(string[] args)

{

int[,] arr = new int[3, 3] {

{ 1, 2, 3},

{ 4, 5, 6},

{ 7, 8, 9},

};

int[,] arr1 = new int[3, 3] {

{ 2, 4, 6},

{ 8, 10, 12},

{ 14, 16, 18},

};

Console.WriteLine("FIRST MATRIX");

for (int i = 0; i < 3; i++)

{

Console.WriteLine();

for (int j = 0; j < 3; j++)

{

Console.Write("{0,3}", arr[i, j]);

}

}

Console.WriteLine("\n");

Console.WriteLine("SECOND MATRIX");

for (int i = 0; i < 3; i++)

{

Console.WriteLine();

for (int j = 0; j < 3; j++)

{

Console.Write("{0,3}", arr1[i, j]);

}

}

Console.WriteLine("");

Console.ReadKey();

Console.WriteLine("\nADDITION OF 2 TWO MATRIX");

for (int k = 0; k < 3; k++)

{

Console.WriteLine();

for (int l = 0; l < 3; l++)

{

Console.Write("{0,3}", (arr[k, l] + arr1[k, l]));

}

}

Console.WriteLine("\n");

Console.ReadKey();

Console.WriteLine("\nSUBSTRACTION OF 2 TWO MATRIX");

for (int k = 0; k < 3; k++)

{

Console.WriteLine();

for (int l = 0; l < 3; l++)

{

Console.Write("{0,3}", (arr1[k, l] - arr[k, l]));

}

}

Console.WriteLine("\n");

Console.ReadKey();

Console.WriteLine("\nMULTIPLICATION OF 2 TWO MATRIX");

for (int k = 0; k < 3; k++)

{

Console.WriteLine();

for (int l = 0; l < 3; l++)

{

Console.Write("{0,5}", (arr1[k, l] \* arr[k, l]));

}

}

Console.WriteLine("\n");

Console.ReadKey();

Output:

Text

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LAB EXPERIMENT NO.

**02**

LIST OF TASKS

|  |  |
| --- | --- |
| TASK NO | OBJECTIVE |
| 01 | **Which type of sorting you want to apply? Create a menu having the following options:**  **Bubble Sort Method Selection Sort Method Insertion Sort Method**  **Implement using methods.** |
| 02 | **Implement Selection sort and print string array data in descending order.** |
| 03 | **A Detox chemical Industry has a list of chemicals along with their concentration and Volume. Your task is to list down the name of chemicals in descending order based on their Volume. To fulfil the task, you have to select any of the sorting method taught in today’s lab with proper reasoning of usage of that algorithm.** |
| 04 | **You must write a program which take input from the user and place the value on correct location in ascending order.** |
| 05 | **Write a program which take N numbers of grocery items from user along with their price. Your main task is to display the items in sorted format. Then allow user to search for any of the item from that list by using name of the item.** |

Submitted On:

**28-10-2021**

(Date: DD/MM/YY)

Task 1: **Which type of sorting you want to apply? Create a menu having the following options:**

**Bubble Sort Method  
Selection Sort Method  
Insertion Sort Method**

**Implement using methods.**  
Solution:

static void Main(string[] args)

{

string start;

do

{

Console.WriteLine("\nSelect Sorting Type....!!");

Console.WriteLine("\n1: Bubble Sorting");

Console.WriteLine("2: Selection Sorting");

Console.WriteLine("3: Insertion Sorting");

int opt;

Console.Write("\nSelect Option : ");

opt = (Convert.ToInt32(Console.ReadLine()));

switch (opt)

{

case 1:

{

int[] array = new int[10];

int n = array.Length;

Console.WriteLine("\n####Bubble Sorting#####");

Console.WriteLine("\nEnter Values in 10 indexes");

for (int i = 0; i < n; i++)

{

Console.Write("\nEnter Value of {0}: ", i + 1);

array[i] = Convert.ToInt32(Console.ReadLine());

}

Console.WriteLine("\n-----Given Data------- ");

Console.WriteLine("");

for (int i = 0; i < n; i++)

{

Console.Write("[{0}] ", array[i]);

}

int k;

for (int m = n; m >= 0; m--)

{

for (int i = 0; i < n - 1; i++)

{

k = i + 1;

if (array[i] > array[k])

{

int temp;

temp = array[i];

array[i] = array[k];

array[k] = temp;

}

}

}

Console.WriteLine();

Console.WriteLine("\n-----After Sorting Data-----");

Console.WriteLine("");

for (int i = 0; i < n; i++)

{

Console.Write("[{0}] ", array[i]);

}

Console.WriteLine();

break;

}

case 2:

{

int[] array = new int[10];

int n = array.Length;

Console.WriteLine("\n####Selection Sorting#####");

Console.WriteLine("\nEnter Values in 10 indexes");

for (int i = 0; i < n; i++)

{

Console.Write("\nEnter Value of {0}: ", i + 1);

array[i] = Convert.ToInt32(Console.ReadLine());

}

Console.WriteLine("\n-----Given Data------- ");

Console.WriteLine("");

for (int i = 0; i < n; i++)

{

Console.Write("[{0}] ", array[i]);

}

int temp, smallest;

for (int i = 0; i < n - 1; i++)

{

smallest = i;

for (int j = i + 1; j < n; j++)

{

if (array[j] < array[smallest])

{

smallest = j;

}

}

temp = array[smallest];

array[smallest] = array[i];

array[i] = temp;

}

Console.WriteLine();

Console.WriteLine("\n-----After Sorting Data-----");

Console.WriteLine("");

for (int i = 0; i < n; i++)

{

Console.Write("[{0}] ", array[i]);

}

Console.WriteLine();

break;

}

case 3:

{

int[] array = new int[10];

int n = array.Length;

Console.WriteLine("\n####Insertion Sorting#####");

Console.WriteLine("\nEnter Values in 10 indexes");

for (int i = 0; i < n; i++)

{

Console.Write("\nEnter Value of {0}: ", i + 1);

array[i] = Convert.ToInt32(Console.ReadLine());

}

Console.WriteLine("\n-----Given Data------- ");

Console.WriteLine("");

for (int i = 0; i < n; i++)

{

Console.Write("[{0}] ", array[i]);

}

for (int i = 0; i < n - 1; i++)

{

for (int j = i + 1; j > 0; j--)

{

if (array[j - 1] > array[j])

{

int temp = array[j - 1];

array[j - 1] = array[j];

array[j] = temp;

}

}

}

Console.WriteLine();

Console.WriteLine("\n-----After Sorting Data-----");

Console.WriteLine("");

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

{

Console.Write("[{0}] ", array[k]);

}

Console.WriteLine();

}

break;

default:

{

Console.WriteLine("Wrong Input...!!!");

break;

}

}

Console.Write("\nIf You Want To Perform Again Press Y : ");

start = Convert.ToString(Console.ReadLine());

} while (start == "y" || start == "Y");

Output:  
  
Text

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Text

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Text

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Task 2: **Implement Selection sort and print string array data in descending order.**  
Solution:  
Console.Write("\nEnter Array Size: ");

int n = Convert.ToInt32(Console.ReadLine());

int[] array = new int[n];

for (int i = 0; i < n; i++)

{

Console.Write("\nEnter Value of {0}: ", i + 1);

array[i] = Convert.ToInt32(Console.ReadLine());

}

Console.WriteLine("\n-----Given Data------- ");

Console.WriteLine("");

for (int i = 0; i < n; i++)

{

Console.Write("[{0}] ", array[i]);

}

int temp, largest;

for (int i = 0; i < n - 1; i++)

{

largest = i;

for (int j = i + 1; j < n; j++)

{

if (array[largest] < array[j])

{

largest = j;

}

}

temp = array[largest];

array[largest] = array[i];

array[i] = temp;

}

Console.WriteLine();

Console.WriteLine("\n-----After Sorting Data In Desecending Order-----");

Console.WriteLine("");

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

{

Console.Write("[{0}] ", array[k]);

}

Console.ReadLine();  
  
  
  
  
  
  
  
  
  
  
  
  
  
  
Output:

Text

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Task 3: **A Detox chemical Industry has a list of chemicals along with their concentration and Volume. Your task is to list down the name of chemicals in descending order based on their Volume. To fulfil the task, you have to select any of the sorting method taught in today’s lab with proper reasoning of usage of that algorithm.**

Solution:

string[] chem = new string[2];

int[] vol = new int[2];

int[] con = new int[2];

for (int i = 0; i < 2; i++)

{

Console.Write("\nChemical's Name: ");

chem[i] = Console.ReadLine();

Console.Write("Chemical's Volume: ");

vol[i] = Convert.ToInt32(Console.ReadLine());

Console.Write("Chemical's Concentration: ");

con[i] = Convert.ToInt32(Console.ReadLine());

}

Console.WriteLine("\nData");

Console.WriteLine("{0,16} {1,16} {2,16}", "Name", "Concent", "Volume");

Console.WriteLine("");

for (int i = 0; i < 2; i++)

{

Console.WriteLine("{0,16} {1,16} {2,16}", chem[i], con[i], vol[i]);

}

String[] sort = new string[4];

for (int i = 0; i < 2; i++)

{

sort[i] = "" + chem[i] + "\t\t\t" + con[i] + "\t\t" + vol[i];

}

Console.WriteLine("\nInsertion Sorting");

for (int i = 0; i < vol.Length - 1; i++)

{

for (int j = i + 1; j > 0; j--)

{

if (vol[j - 1] < vol[j])

{

String temp = sort[j - 1];

sort[j - 1] = sort[j];

sort[j] = temp;

}

}

}

Console.WriteLine("\n{0,16} {1,16} {2,16}", "Name", "Concent", "Volume");

Console.WriteLine("");

for (int i = 0; i < 4; i++)

{

Console.WriteLine("{0,16}", sort[i]);

}

}

Output:  
  
Text

Description automatically generated

Task 4: **You must write a program which take input from the user and place the value on correct location in ascending order.**

Solution:  
Console.Write("\nEnter Array Size: ");

int n = Convert.ToInt32(Console.ReadLine());

int[] array = new int[n];

for (int i = 0; i < n; i++)

{

Console.Write("\nEnter Value of {0}: ", i + 1);

array[i] = Convert.ToInt32(Console.ReadLine());

}

Console.WriteLine("\n-----Given Data------- ");

Console.WriteLine("");

for (int i = 0; i < array.Length; i++)

{

Console.Write("[{0}] ", array[i]);

}

Console.WriteLine();

int k;

for (int m = array.Length; m >= 0; m--)

{

for (int i = 0; i < array.Length - 1; i++)

{

k = i + 1;

if (array[i] > array[k])

{

int temp;

temp = array[i];

array[i] = array[k];

array[k] = temp;

}

}

}

Console.WriteLine();

Console.WriteLine("\n-----ASCENDING ORDER-----");

Console.WriteLine("");

for (int i = 0; i < array.Length; i++)

{

Console.Write("[{0}] ", array[i]);

}

Console.ReadLine();

Output:

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Task 5: **Write a program which take N numbers of grocery items from user along with their price. Your main task is to display the items in sorted format. Then allow user to search for any of the item from that list by using name of the item.**

Solution:  
  
static void Insertion\_sort(string[,] array)

{

string temp, name;

for (int i = 0; i < array.Length / 2 - 1; i++)

{

for (int j = i + 1; j > 0; j--)

{

float p1 = float.Parse(array[j - 1, 1]);

float p2 = float.Parse(array[j, 1]);

if (p1 > p2)

{

temp = array[j - 1, 1];

array[j - 1, 1] = array[j, 1];

array[j, 1] = temp;

name = array[j - 1, 0];

array[j - 1, 0] = array[j, 0];

array[j, 0] = name;

}

}

}

display(array);

}

static void display(string[,] array)

{

for (int i = 0; i < array.Length / 2; i++)

{

Console.WriteLine();

Console.WriteLine("\nName: \t" + array[i, 0]);

Console.WriteLine("Price: \t" + array[i, 1]);

Console.WriteLine();

}

}

static void selecting(String[,] array)

{

Console.Write("Find Any Item? (Y/N): ");

char ans = Convert.ToChar(Console.ReadLine());

if (ans == 'Y' || ans == 'y')

{

do

{

Console.Write("\nItem Name? ");

string name = Console.ReadLine();

for (int i = 0; i < array.Length / 2; i++)

{

if (name.ToLower() == array[i, 0])

{

Console.WriteLine();

Console.WriteLine("Item at Index:{0}", i);

Console.WriteLine("\nName: " + array[i, 0]);

Console.WriteLine("Price: " + array[i, 1]);

Console.WriteLine();

}

}

Console.Write("Find Any Item? (Y/N): ");

ans = Convert.ToChar(Console.ReadLine());

} while (ans == 'y' || ans == 'Y');

}

}

static void Main(string[] args)

{

Console.Write("\nEnter Grocery Items You Want To Buy: ");

int n = Convert.ToInt32(Console.ReadLine());

string[,] list = new string[n, 2];

for (int i = 0; i < list.Length / 2; i++)

{

Console.Write("\nName Of Item: ");

list[i, 0] = Console.ReadLine();

Console.Write("Price Of Item: ");

list[i, 1] = Console.ReadLine();

}

Insertion\_sort(list);

selecting(list);

}

Output:  
  
Text

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