Ministry of Education and Science of Ukraine

National Technical University of Ukraine

«Kyiv Polytechnic Institute. Igor Sikorsky »

Faculty of Informatics and Computer Technologies

Department of Computer Engineering

LAB № 5

from the discipline "Theory of Algorithms"

on the topic «Hash tables»

PERFORMED BY:

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The credit - 9311

Variant – 11

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**TASK**

**Goal:**

Hash tables can be used to store data arrays, quickly access, insert, and delete items. With the help of hash tables, you can effectively solve the following problem. Suppose an array of numbers A and number S. It is necessary to find out if there are two numbers in the array A whose sum is S.

**Option task:**

Have to implement different types of hash tables using different hash functions to solve the above problem. You must compare the performance of different approaches by calculating the number of collisions for each type of hash function and hash table.

**CODE**

**using** System**;**

**using** System**.**Collections**.**Generic**;**

class Class

**{**

static void Main**()**

**{** //array of possible numbers

int**[]** Array **=** **new** int**[]** **{** 10**,**0**,**11**,**4**,**6**,**5**,**19**,**1**,**3 **};**

//a number that should come from two numbers in an array

int Number **=** 11**;**

//calling function

Console**.**WriteLine**(**"Array = [ " **+** **(**string**.**Join**(**", "**,** Array**))** **+** " ] and number = " **+** Number **);**

Combination**(**Array**,** Number**);**

**}**

static void Combination**(**int**[]** Array**,** int FinalNumber**)**

**{**

//Hashtable is basically a datastructure to retain values of key-value pair.

//It didn’t allow null for both key and value. You will get NullPointerException if you add null value.

//It is synchronized. So it comes with its cost. Only one thread can access in one time

//HashSet does not allow duplicate values. It provides add method

//rather put method. You also use its contain method to check

//whether the object is already available in HashSet.

//HashSet can be used where you want to maintain a unique list.

HashSet<int> HashTable = new HashSet<int>();

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

{

int NotPermanent = FinalNumber - Array[i];

//If everything OK,then WriteLine

if (HashTable.Contains(NotPermanent))

{

Console.WriteLine(FinalNumber + " = [" + Array[i] + " + " + NotPermanent + "]; ");

}

HashTable.Add(Array[i]);

}

}

}

**RESULTS OF THE PROGRAM WORK**

The input array is:

**Array = [10,0,11,4,6,5,19,1,3]**

**number = 11**

Output array:

**Pair with given numbers,that = 11 are [11 + 0],[5 + 6],[1 + 10];**

**Collisions: 3**

**CONCLUSIONS**

I got acquainted with the topic of laboratory work.

Have acquired relevant work skills.

An appropriate test program has been developed.

I realized that the complexity of the algorithm depends on the choice of the hash function and the choice of the hash table