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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**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**

# Import randint function from random library

**from** random **import** randint

# function to check for the given sum in the array

**def** printPairs**(**arr**,** arr\_size**,** **sum):**

# Variable that response for collisions

collisions **=** 0

# Create an empty hash set

s **=** **set()**

# Algoritm itself

**for** el **in** arr**:**

temp **=** **sum-**el

**if** **(**temp **in** s**):**

# Success

**print(** f'Pair with given sum {**sum**} is ({el}, {temp})'**)**

**else:**

# Collision

collisions **+=** 1

s**.**add**(**el**)**

**print(**'Collisions:'**,**collisions**)**

# driver program to check the above function

A **=** **[**randint**(**1**,** 100**)** **for** \_ **in** **range(**100**)]**

n **=** randint**(**1**,** 100**)**

printPairs**(**A**,** **len(**A**),** n**)**

**RESULTS OF THE PROGRAM WORK**

The input array is:

A = [75, 96, 44, 64, 99, 29, 24, 66, 50, 41, 75, 97, 96, 18, 16, 34, 46, 30, 37, 66, 24, 34, 50, 73, 20, 98, 13, 41, 68, 95, 8, 82, 79, 50, 94, 9, 60, 21, 53, 53, 6, 58, 37, 41, 53, 83, 72, 65, 74, 26, 78, 87, 64, 89, 30, 52, 34, 53, 52, 98, 100, 51, 65, 38, 33, 44, 71, 99, 78, 25, 73, 95, 30, 1, 59, 7, 12, 34, 7, 75, 56, 88, 19, 18, 70, 23, 2, 84, 7, 21, 41, 70, 59, 56, 51, 1, 48, 65, 96, 84]

S = 2

Output array:

Pair with given sum 2 is (1, 1)

Collisions: 99

**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