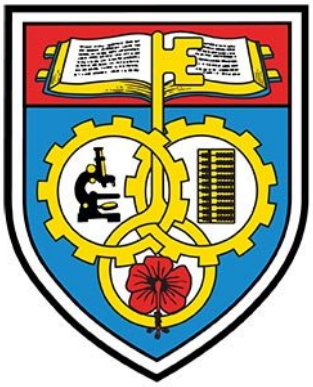

KOLEJ UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY OF COMPUTING AND INFORMATION TECHNOLOGY

BACS1013 Problem Solving And Programming

Assignment Report

July 2022 Semester

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Declaration

Declaration of Originality

I declare that this assignment is free from all forms of plagiarism and for all intents and purposes is my own work. I understand that I will be penalized if I have not complied with TAR UC's Plagiarism policy.

Signature : Hw Name : Beh Hui Wen Date : 08/09/2022

Content

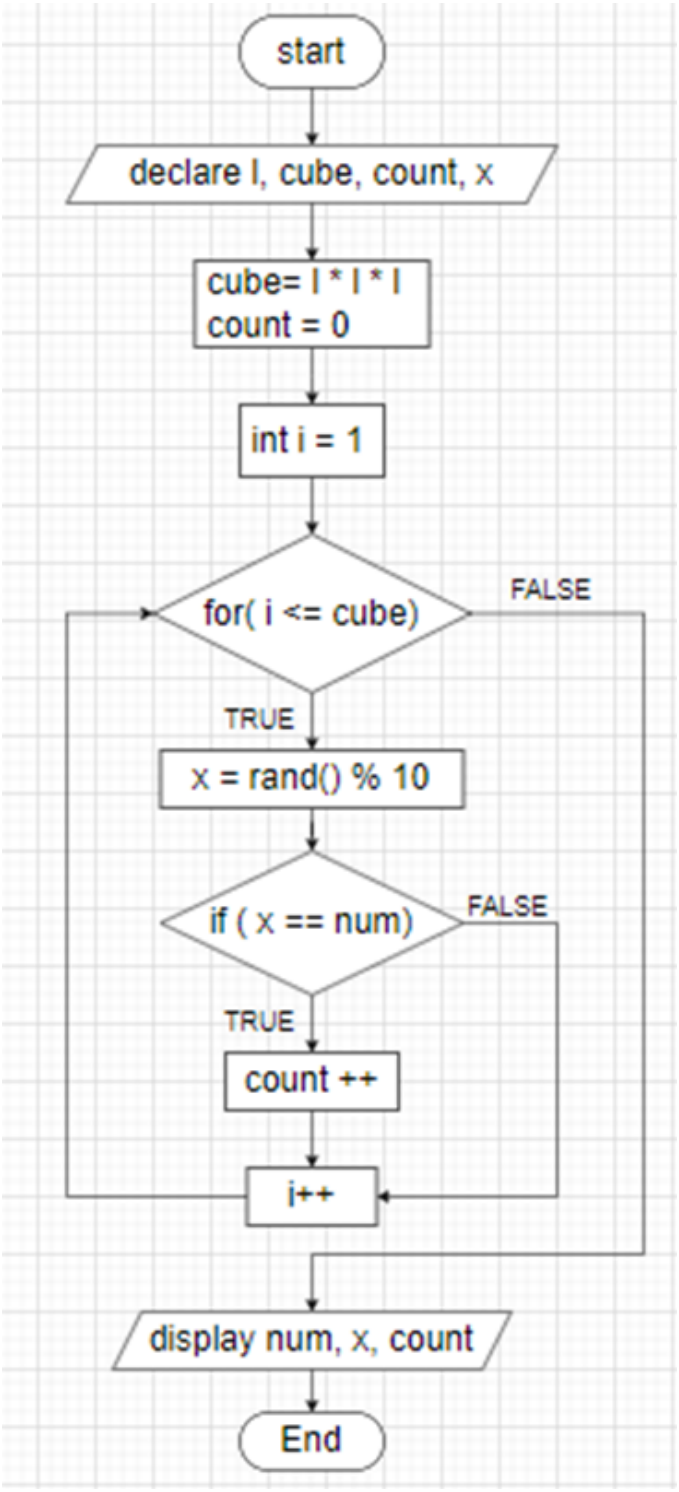
Activity 1

1.1Brief Description

Actions and events that occur regularly to us are usually not given much afterthought. You press the button on your phone and it you expect it to do what it's supposed to. You issue a voice command into the machine and something must happen. We don't think long and hard of these actions and accept them for what they are. However as programmers and engineers, we usually need to think long and hard to formulate a sequence of steps before anything can occur, really. Even for normal everyday events that we would take for granted, those events can happen because programmers with engineers probably had thought long and hard logically and scientifically to make it a reality.

You have a cube with equal size dimensions L x H x W (in dimensionless units). The cube is described by points contained within it. For example, a 3 x 3 x 3 cube would have 27 points and each point is located equidistance from the next. At each point, a certain number (0 - 9) is placed. And across all the other points, other numbers (0-9) are placed in random. Your task is to find out how many points contain the number X (where X is the target that you want to count for).

1.2 Overall Program Design



1.3 Program Testing & Output (3 times)			
	Input	process	Output
Enter an integer number	3	3 * 3 * 3	27
Enter the number you are looking for	1	Compare random number	(appear times)

1	Enter an integer number : 3 The cube of 3 is 27 points Enter the number you are looking for : 1 5 0 0 0 1 4 6 2 0 3 2 5 6 3 1 9 9 3 2 9 5 4 4 4 5 4 5 this number was appeared 2 time(s)
2	Enter an integer number : 3 The cube of 3 is 27 points Enter the number you are looking for : 1 7 0 2 7 3 3 3 7 6 9 3 5 9 7 6 2 5 5 9 0 6 3 2 4 5 8 4 this number was appeared 0 time(s)
3	Enter an integer number : 3 The cube of 3 is 27 points Enter the number you are looking for : 1 4 3 5 6 6 9 4 7 7 2 9 8 0 5 4 5 3 7 7 9 6 9 8 5 4 4 3 this number was appeared 0 time(s)

1.4 Constants				
No	Data	Value	Data type	Purpose
1	Enter an integer number :	-	string	display lets the user know what data should now be entered into the program.
2	The cube of	-	string	display the result of the cube calculation.
3	Enter the number you are looking for	-	string	display lets the user know what data should now be entered into the program.
4	\n	-	string	To start a new line of output
5	//	-	string	This comment has no display, just arguments in the program and is easy to view for programmers in future.
6	count	0	integer	A initialization value of variable
7	i	0	integer	Initialization and condition within for loop

1.4 Variables			
No	Data	Data Type	Purpose
1	l	integer	Length, use to count the points of a cube
2	cube	integer	take the value of the length calculation result
3	num	integer	use compare with variable x
4	count	integer	retain and updating the number appear times
5	i	integer	Control variable, updating for loop
6	x	integer	random number

1.5 Addition feature	
function	description
<iostream>	A file include standard input and output stream object
<stdlib.h>	Contains function for conversions of numbers to text and vise versa, memory allocation, random numbers and various other utility functions.
<cmath>	Contains function for manipulating the time and date
For loop	Loop are used to repeat a block of code that have initialization, condition and update
If statement	(One-way)if the condition true run the action that inside the parentheses

1.6 Program Listing

```
#include <iostream>
#include <stdlib.h>
#include <time.h>
using namespace std;

int main()
{
   int  l, cube, num, count, x;

   // l is length, cube length is equal size
   cout<<"Enter an integer number : ";
   cin>>l;
   cube = l * l * l;
   cout<<"The cube of "<< l <<" is "<< cube <<" points"<<endl;

   cout<<"Enter the number you are looking for : ";
   cin>>num;
   count = 0;
   srand(time(0));

   for (int i=1; i <= cube;i++) {
      // x is random number , print x to check the result
      x = rand() % 10;
      cout<<x<<" ";
      if(x == num){
         count++;
      }
   }

   cout<<"\nthis number was appeared "<<count<<" time(s)";
}
```

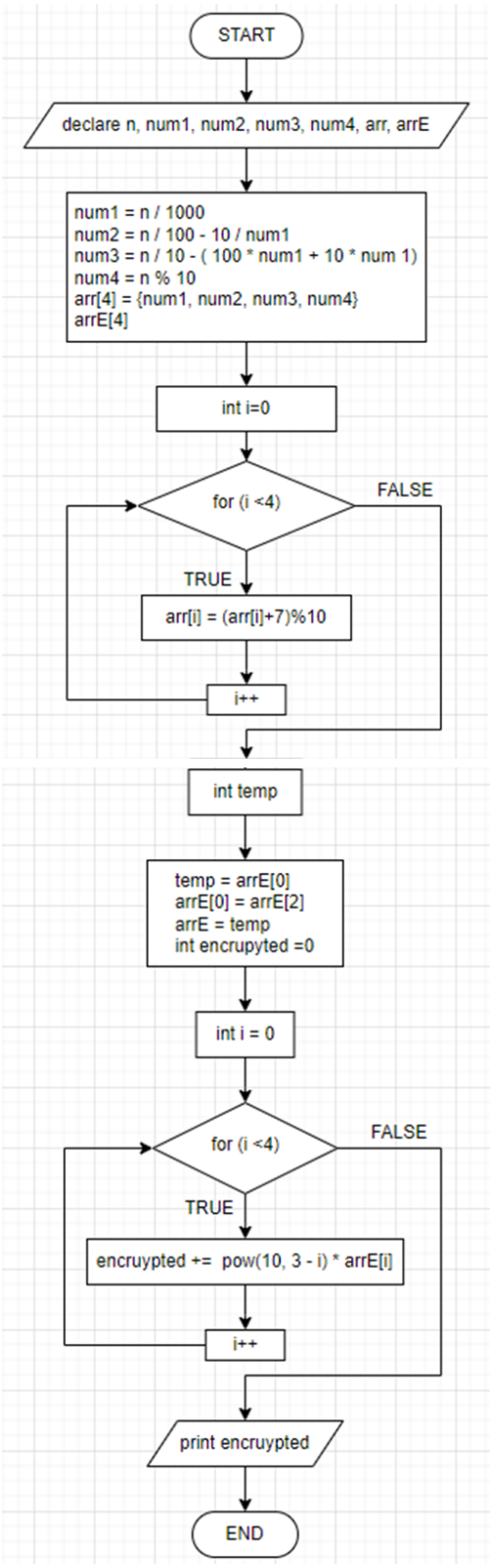
Activity 2

2.1 Brief Description

A company wants to transmit encrypted data over the telephone. All of their data is transmitted as four-digit integers. You have been handed this task of writing a program to encrypt data for more secure transmission. Your program should read a four-digit integer and encrypt it as follows:

i. Replace each digit by the sum of that digit plus 7 modulus 10.
ii. Swap the first digit with the third.
iii. Print the encrypted integer.

2.2 Overall Program Design



2.3 Program Testing & Output (3 times)			
	Input	Process	Output
Enter four digit number	1234	Run algorithm formula and change place	Encrypted number (0981)
1	Enter four digit number : 1234 The encrypted four digit number is : 981		
2	Enter four digit number : 2345 The encrypted four digit number is : 1092		
3	Enter four digit number : 5678 The encrypted four digit number is : 4325		

2.4 Constants			
No	Data	Data type	Purpose
1	Enter four digit number :	string	display lets the user know what data should now be entered into the program.
2	//	string	This comment has no display, just arguments in the program and is easy to view for programmers in future.
3	\n	string	To start a new line of output
4	The encrypted four digit number is	string	display the result of the encrypted data calculation.

2.4 Variables			
No	Data	Data type	Purpose
1	n	integer	N is user input (4-digit)variable
2	num1	integer	First number,get the variable by n and do calculation
3	num2	integer	Second number,get the variable by n and do calculation
4	num3	integer	Third number,get the variable by n and do calculation
5	num4	integer	Fourth number,get the variable by n and do calculation
6	arr	integer	Array, store the num together to index
7	arrE	integer	New array to store update variable
8	temp	integer	Prepare to change the num place future
9	i	integer	the variable use to “for loop”
10	encrypted	integer	A variable to get new value

2.5 Addition feature	
function	description
<iostream>	A file include standard input and output stream object
<stdlib.h>	Contains function for conversions of numbers to text and vise versa, memory allocation, random numbers and various other utility functions.
<cmath>	Contains function for manipulating the time and date
array	Contain elements from index array indices start with 0
For loop	Loop are used to repeat a block of code that have initialization, condition and update

2.6 Program Listing (Activity 2)

```
#include <iostream>
#include <stdlib.h>
#include <cmath>
using namespace std;

int main ()
{
   int n, num1, num2, num3, num4;

   cout << "Enter four digit number : ";
   cin >> n;

   num1 = n / 1000;
   num2 = n / 100 - 10 * num1;
   num3 = n / 10 - (100 * num1 + 10 * num1);
   num4 = n % 10;

   // Replace each digit by the sum of that digit plus 7 modulus 10
   // arr = array , E = encrypted
   int arr[4] = {num1, num2, num3, num4};
   int arrE[4];
   for (int  i = 0; i < 4; i++) {
      arrE[i] = (arr[i] + 7) % 10;
      // cout<<arrE[i]<<" ";   ( check result )
   }

   // swap the first digit with the third
   int temp;
   temp = arrE[0];
   arrE[0] = arrE[2];
   arrE[2] = temp;

   int encrypted = 0;
   for (int i = 0; i < 4; i++) {
      encrypted += pow(10, 3 - i) *  arrE[i];
   }

   cout << "\nThe encrypted four digit number is : " << encrypted;
   return 0;
}
```

Question

From your understanding of the above two activities, which portion do you think can be Modularized?

I think using int main is better, cause main() is a predefined function,It is responsible for starting and ends of the program. It is a universally accepted keyword in programming language and cannot change its meaning and name. A main() function is a user-defined function in C that means we can pass parameters to the main() function according to the requirement of a program. A main() function is used to invoke the programming code at the run time, not at the compile time of a program.

Overall

3.1 discussion

Based on these two problems, come up with different solutions to meet the requirements of the problem. The first program uses the srand and for loops learned in class, and the second program uses for loops and arrays. Since the solution is done for a specific task, there will be some incomplete gaps. The **first** solution I used can be used to count equilateral cubes of different sizes and find the number of occurrences of the number you want among the n points that appear in it. Where this can be applied, not sure yet, but let me apply what I have learned in class rationally and strengthen my logical thinking. The **second** program data encryption is close to our lives. There are programs around us that encrypt data using complex algorithms with different rules. In the era of the developed Internet, it can protect our important files or privacy from being easily stolen. For example, different brands of mobile phones will have different data encryption schemes to protect users' data and account passwords registered in different places. It will be encrypted, so that it is not easy for others to crack it, because the encrypted data is cracked, which is equivalent to exposing the data to the cracker, which is very dangerous.

3.2 Conclusion

The programming solution has been completed, but there are still some problems that need to be strengthened and improved, and more different functions and perspectives are used to solve the problem.The first program doesn't have limited input of variable l, it’s an effect for cube calculation.The second program have same problem.