

Lab3 Roll Call System

For this problem, we hope all of you to learn how to implement linear congruential generator and read file in C++. We will provide you template class file, you have to complete class methods by yourself.

What you need to do in lab3:

- (1) Open the file that stores all student's names from outside.
- (2) Add all student names to a vector.
- (3) Randomly pick some student names (by linear congruential generator) and add them to another vector.
- (4) Calculate how many different alphabets (lowercase and uppercase are the same) are there from picked student names.

For this lab section, we will upload our new test case during lab demo on 3/18, you need to check the lab3 assignment again and download it on e3.

After you complete all the methods of the class, you should ask the TA for the DEMO.

We provide a file (lab3.cpp) and a test case (student.txt) for you.

Inside lab3.cpp:

Class member:

int a, c, m, seed
fstream fin
vector studentName, pickedStudentName

Class methods:

| | |
|--------------------------------|--|
| void OpenFile() : | open the file |
| void AddNames() : | add names to studentName vector. |
| int GenerateRandomNumber() : | randomly generate the integer. |
| void PickNames(): | pick names from studentName vector. |
| void PrintPickedStudentNames() | print all picked names. |
| void CaculateAlphabets(): | calculate how many different alphabets are used in picked names. |

Hint:

(1)Linear Congruential Generator:

A Linear Congruential Generator (LCG) is an algorithm that yields a sequence of pseudo-randomized numbers calculated with a discontinuous piecewise linear equation.

$$X_{n+1} = (aX_n + c) \bmod m$$

m: $0 < m$, the modulus
a: $0 < a < m$, the multiplier
c: $0 \leq c < m$, the increment
 X_0 : $0 \leq X_0, m$, the seed (start value)

(2)Fstream:

Reference website: <https://www.cplusplus.com/reference/fstream/fstream/>

Or see the Slide "01_C++UsefulFunctions_voice"

Your file should be put in the same directory of your c++ project.

I/O Specification:

Input file: **(Please don't modify the file)**

First line: the number of students

After adding all student names, you will see how many times you should do the test, and then you will see other numbers for (seed, a, c, m, pick_student_num)

Output:

You need to input the filename first, and then let your program run.

Example:

Input:

```
39
Oliver
Jake
Noah
James
Jack
Connor
Liam
John
...
Twyla
Tyne
UdeleZ
3
17 1 5 39 3
1 1 2 39 5
35 27 37 39 7
```

Output:

```
Filename: student.txt
Picked Name:
Sophia
Cahir
Trudy
Total alphabets: 12
Picked Name:
James
Connor
John
Callum
Robert
Total alphabets: 14
Picked Name:
John
Churchill
Olivia
Jake
Cabal
Mason
Tuesday
Total alphabets: 19
```