

# Assignment 4 report

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**environment:** c++ 14 CLion

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## part1 - Analysis

1. The first four number of SID should be randomly in [2000, 2020],last four number randomly in [0, 9999]
2. The scores are random at 0-5, so use the random library in c ++ 11 to generate SID and scores Random number.
3. read the store\_file and then calculate the average ,list the lower labs.
4. using switch to satisfy the problem 5.

## part2 - Code

```

//Q1,Q2,Q3
#include <iostream>
#include <vector>
#include <set>
#include <random>
#include <algorithm>
#include <fstream>

using namespace std;

struct Student {
    int sid;
    int labs[14];
};

const string store_file = "lab_records.csv"; //Q3 store in filename and Q4 to read

int random(int start, int end);

int generateSID();

Student generateStudent();

int readInt(int start, int end);

vector<Student> Q1();

void Q2(const vector<Student> &students);

void Q3(const vector<Student> &students);

int main() {
    vector<Student> students = Q1();
    cout << endl;

    Q2(students);
    cout << endl;

    Q3(students);
    cout << endl;

    return 0;
}

int random(int start, int end) {
    static random_device rd;
    static mt19937 gen(rd());
    static uniform_int_distribution<> dis{};
    int ans = start + dis(gen) % (end - start + 1);
    return ans;
}

```

```

int generateSID() {
    int year = random(2000, 2020);
    int num = random(0, 9999);
    int sid = year * 10000 + num;
    return sid;
}

int readInt(int start, int end) {
    try {
        string input;
        cin >> input;
        int i = stoi(input);
        if (i < start || i > end) {
            throw exception();
        }
        return i;
    } catch (const exception &e) {
        cout << "Input is error, end the program." << endl;
        exit(0);
    }
}

```

```

Student generateStudent() {
    static set<int> sids{};
    Student s{};
    int sid = generateSID();
    while (sids.find(sid) != sids.end()) {
        sid = generateSID();
    }
    s.sid = sid;
    for (auto &lab : s.labs) {
        lab = random(0, 5);
    }
    return s;
}

```

```

vector<Student> Q1() {
    cout << "how many student have: ";
    int n = readInt(1, INT32_MAX);
    vector<Student> students{};
    for (int i = 0; i < n; ++i) {
        students.push_back(generateStudent());
    }
    for (auto &s : students) {
        cout << s.sid << ": ";

        cout << s.labs[0];

        for (int i = 1; i < 14; i++) {
            cout << ", " << s.labs[i];

```

```

    }
    cout << endl;
}
return students;
}

void Q2(const vector<Student> &students) {
    cout << "those students absent >= 2 times:\n";
    for (auto &s : students) {
        int times = 0;
        for (auto &lab : s.labs) {
            if (lab == 0) {
                times++;
            }
        }
        if (times >= 2) {
            cout << "Student" << s.sid << " had absent " << times << " times." << endl;
        }
    }
}

void Q3(const vector<Student> &students) {
    ofstream fout(store_file);
    if (!fout.good()) {
        cout << "The file: " << store_file << " save failed\n";
        exit(0);
    }
    for (auto &s : students) {
        fout << s.sid << "," << s.labs[0];
        for (int i = 1; i < 14; i++) {
            fout << "," << s.labs[i];
        }
        fout << endl;
    }
    fout.close();
    cout << "store file:" << store_file << " successfully!" << endl;
}

```

```

//Q4
#include <iostream>
#include <fstream>
#include <vector>
#include <set>
#include <random>
#include <algorithm>

using namespace std;

const string read_file = "lab_records.csv";

using namespace std;

int main() {
    ifstream fin(read_file);
    if (!fin.good()) {
        cout << "Open fail the file: " << read_file << endl;
        exit(0);
    }

    string line;
    int num = 0;
    int grades[15]{};
    int total = 0;

    while (getline(fin, line)) {
        size_t pos = 0;
        string delimiter = ",";
        int column = 0;
        string token[15];

        while ((pos = line.find(delimiter)) != string::npos) {
            token[column] = line.substr(0, pos);
            line.erase(0, pos + delimiter.length());
            column++;
        }
        token[column] = line;
        num++;
        for (int i = 1; i <= 14; ++i) {
            int it_score = stoi(token[i]);
            grades[i] += it_score;
            total += it_score;
        }
    }
    fin.close();

    double total_average = ((double) total) / num / 14;

    cout << "those labs lower than average scores: " << total_average << endl;
}

```

```
for (int i = 1; i <= 14; ++i) {  
    double average = ((double) grades[i]) / num;  
    if (average < total_average) {  
        cout << "lab" << i << " average score is: " << average << endl;  
    }  
}  
  
return 0;  
}
```

```

//Q5
#include <iostream>
#include <string>

using namespace std;

int getIndex(string *start, string *end, const string &toSearch) {
    int i = 0;
    while (start != end) {
        if (*start == toSearch) {
            return i;
        }
        i++;
        start++;
    }
    return -1;
}

int main() {
    string operators;
    string commands[] = {"start", "stop", "restart", "reload", "status", "exit"};

    while (true) {
        cout << "> ";
        getline(cin, operators);
        int index = getIndex(begin(commands), end(commands), operators);

        switch (index) {
            case -1:
                cout << "Invalid command" << endl;
                break;
            case 5:
                cout << "Exit program" << endl;
                return 0;
            default:
                cout << "Execute " << operators << " operators\n";
                break;
        }
    }
}

```

## part 3 - Result & Verification

Test case #1: Q1\_2\_3 Invalid input num

input: a

output: Input is error, end the program.

```
A4_1 x
D:\ProjectOfCLion\cs205_c++\A4\cmake-build-debug\A4_1.exe
how many student have: ae
Input is error, end the program.
```

## Test case #2: Q1\_2\_3 correct input

input: 15

output:

```
20168653: 5, 1, 5, 1, 5, 0, 0, 1, 3, 5, 4, 1, 2, 1
20182749: 1, 0, 1, 2, 1, 2, 1, 1, 3, 3, 0, 2, 3, 2
20068970: 3, 3, 1, 5, 5, 2, 4, 3, 3, 1, 0, 5, 5, 5
20028270: 5, 0, 4, 0, 5, 3, 2, 2, 1, 2, 1, 4, 2, 0
20201937: 2, 2, 0, 1, 2, 2, 1, 4, 5, 3, 3, 0, 4, 1
20127314: 1, 3, 0, 1, 2, 3, 0, 2, 3, 4, 5, 5, 2, 5
20015650: 4, 1, 2, 2, 3, 1, 0, 0, 1, 3, 5, 2, 0, 1
20081965: 2, 4, 1, 0, 3, 4, 2, 1, 2, 3, 2, 3, 3, 5
20180661: 4, 5, 3, 3, 3, 4, 0, 3, 2, 2, 4, 4, 4, 0
20113604: 4, 1, 4, 5, 3, 4, 2, 5, 2, 0, 1, 3, 4, 4
20091666: 2, 3, 0, 4, 1, 1, 3, 2, 5, 0, 4, 4, 0, 2
20003614: 2, 3, 1, 5, 2, 3, 1, 1, 3, 5, 4, 3, 0, 5
20035872: 4, 2, 5, 4, 0, 4, 5, 4, 4, 0, 1, 0, 2, 5
20014754: 0, 5, 5, 1, 3, 1, 5, 5, 1, 2, 1, 5, 5, 5
20114503: 1, 1, 3, 0, 3, 3, 2, 1, 1, 4, 0, 2, 1, 5
```

those students absent >= 2 times:

Student20168653 had absent 2 times.

Student20182749 had absent 2 times.

Student20028270 had absent 3 times.

Student20201937 had absent 2 times.

Student20127314 had absent 2 times.

Student20015650 had absent 3 times.

Student20180661 had absent 2 times.

Student20091666 had absent 3 times.

Student20035872 had absent 3 times.

Student20114503 had absent 2 times.

store file:lab\_records.csv successfully!



```
A4_1 x
↑
↓
how many student have: 15
20168653: 5, 1, 5, 1, 5, 0, 0, 1, 3, 5, 4, 1, 2, 1
20182749: 1, 0, 1, 2, 1, 2, 1, 1, 3, 3, 0, 2, 3, 2
20068970: 3, 3, 1, 5, 5, 2, 4, 3, 3, 1, 0, 5, 5, 5
20028270: 5, 0, 4, 0, 5, 3, 2, 2, 1, 2, 1, 4, 2, 0
20201937: 2, 2, 0, 1, 2, 2, 1, 4, 5, 3, 3, 0, 4, 1
20127314: 1, 3, 0, 1, 2, 3, 0, 2, 3, 4, 5, 5, 2, 5
20015650: 4, 1, 2, 2, 3, 1, 0, 0, 1, 3, 5, 2, 0, 1
20081965: 2, 4, 1, 0, 3, 4, 2, 1, 2, 3, 2, 3, 3, 5
20180661: 4, 5, 3, 3, 3, 4, 0, 3, 2, 2, 4, 4, 4, 0
20113604: 4, 1, 4, 5, 3, 4, 2, 5, 2, 0, 1, 3, 4, 4
20091666: 2, 3, 0, 4, 1, 1, 3, 2, 5, 0, 4, 4, 0, 2
20003614: 2, 3, 1, 5, 2, 3, 1, 1, 3, 5, 4, 3, 0, 5
20035872: 4, 2, 5, 4, 0, 4, 5, 4, 4, 0, 1, 0, 2, 5
20014754: 0, 5, 5, 1, 3, 1, 5, 5, 1, 2, 1, 5, 5, 5
20114503: 1, 1, 3, 0, 3, 3, 2, 1, 1, 4, 0, 2, 1, 5

those students absent >= 2 times:
Student20168653 had absent 2 times.
Student20182749 had absent 2 times.
Student20028270 had absent 3 times.
Student20201937 had absent 2 times.
Student20127314 had absent 2 times.
Student20015650 had absent 3 times.
Student20180661 had absent 2 times.
Student20091666 had absent 3 times.
Student20035872 had absent 3 times.
Student20114503 had absent 2 times.

store file:lab_records.csv successfully!
```

Test case #3: **Q4**

output:

those labs lower than average scores: 2.48095

lab2 average score is: 2.26667

lab3 average score is: 2.33333

lab4 average score is: 2.26667

lab6 average score is: 2.46667

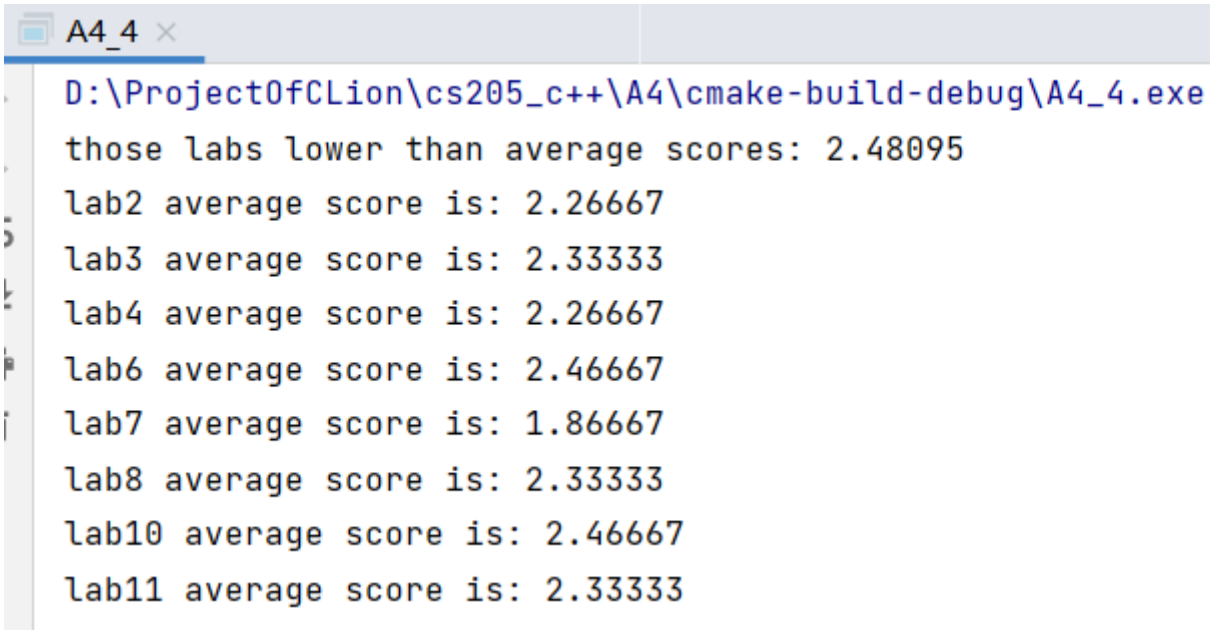
lab7 average score is: 1.86667

lab8 average score is: 2.33333

lab10 average score is: 2.46667

lab11 average score is: 2.33333

lab13 average score is: 2.46667



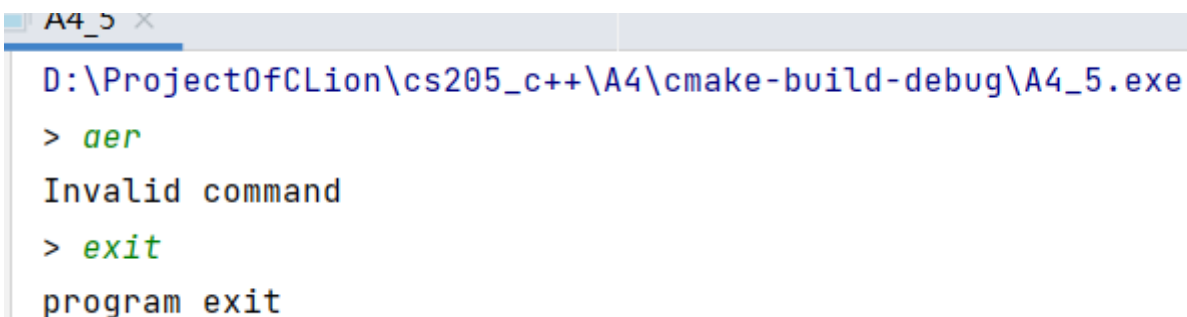
```
A4_4 x
D:\ProjectOfCLion\cs205_c++\A4\cmake-build-debug\A4_4.exe
those labs lower than average scores: 2.48095
lab2 average score is: 2.26667
lab3 average score is: 2.33333
lab4 average score is: 2.26667
lab6 average score is: 2.46667
lab7 average score is: 1.86667
lab8 average score is: 2.33333
lab10 average score is: 2.46667
lab11 average score is: 2.33333
```

#### Test case #4: **Q5 Invalid input**

// the program not end until input exit

input: aer

output: Invalid command



```
A4_5 x
D:\ProjectOfCLion\cs205_c++\A4\cmake-build-debug\A4_5.exe
> aer
Invalid command
> exit
program exit
```

#### Test case #5: **Q5 correct input**

```
input: start stop restart reload status exit
output:
> start
command start recognized
> stop
command stop recognized
> restart
command restart recognized
> reload
command reload recognized
> status
command status recognized
> exit
program exit
```

A screenshot of a CLion IDE terminal window. The title bar shows a folder icon and the text 'A4\_5 x'. The terminal content shows the execution of 'D:\ProjectOfCLion\cs205\_c++\A4\cmake-build-debug\A4\_5.exe'. The user enters commands 'start', 'stop', 'restart', 'reload', 'status', and 'exit' in green text, and the program responds with 'command [command] recognized' or 'program exit' in blue text. The left sidebar of the IDE is partially visible, showing icons for Explorer, Run and Debug, and Tools.

```
D:\ProjectOfCLion\cs205_c++\A4\cmake-build-debug\A4_5.exe
> start
command start recognized
> stop
command stop recognized
> restart
command restart recognized
> reload
command reload recognized
> status
command status recognized
> exit
program exit
```

## part 4 - Difficulties & Solutions

### Difficulties

Using CLion, cannot find file lab\_records.csv. And the exe file also not found.

### Solutions

check my assignment4 file and then find they are in the folder with the orange icon. not in the outside.