

第三次作业——简单成绩管理系统

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I. 题目分析

题目要求：

要编写一个对某班 30 个学生 C++ 语言课程成绩进行管理的小程序，功能包括成绩信息录入、显示、成绩查询、成绩插入、成绩删除、成绩排序，用数组存放这 30 个学生成绩。请把程序运行结果截图与程序一起提交。

菜单设计：

***** 主菜单 *****

* 1: 录入成绩 *

* 2: 显示成绩 *

* 3: 查询成绩 *

* 4: 插入成绩 *

* 5: 删除成绩 *

* 6: 成绩排序 *

* 0: 退出 *

分析：

1 在退出之前，应该能够针对菜单做出选择，所以考虑 while 循环；

2 插入成绩与录入成绩不同，录入成绩在数组最后添加，而插入成绩应该在指定某个位置前添加；

3 录入成绩最好实现一次录入多次成绩功能，这里以“-1”作为录入成绩结束的标志；

4 排序算法使用插入排序；

5 每次对记录进行更新，应该更新相应文件，这里文件为” mark.txt “，该文件存储了所有已录入的学生的成绩；

6 mark.txt 只有一行内容，比如：60 80 30 89 50 46 80 90 30 80 95 55 70 86 70 34 89 78 34 65，以空格为标志使用 fstream 类操作，用法类似 cin, cout；

7 输入错误可能导致程序崩溃。

II. 代码

```
/**
 * @file markmanage.cpp
 * @Synopsis Simple management system of student's marks in C++
 * @author Binzo
 * @version 1.0.0
 * @date 2015-04-15
 */
```

```

#include <iostream>
#include <fstream>
using namespace std;

// global variables
char fileName[] = "mark.txt";
int marks[100];
int Nrec; // number of records

// display the main menu
void displayMenu();
// read from file "mark. txt"
void readFromFile();
// save the records of marks to file "mark.txt"
void saveToFile();

// six options
void record();
void display();
void query();
void insert(); // insert is different from record
void mydelete(); // since delete is the keyword in C++
void sort();

int main(){
    int isQuit = false;
    int opt; //option
    while( !isQuit ){
        displayMenu(); // menu
        readFromFile(); // read from "mark.txt"
        cout << "Do your choice: " << endl;
        cin >> opt;
        switch( opt ){
            case 1:
                record();
                break;
            case 2:
                display();
                break;
            case 3:
                query();

```

```

        break;
    case 4:
        insert();
        break;
    case 5:
        mydelete();
        break;
    case 6:
        sort();
        break;
    case 0:
        isQuit = true;
        break;
    default:
        cout << " !!! Illegal input !!!" << endl;
        cout << endl;
    }
}

}

void displayMenu(){
    cout << " ***** Main Menu *****" << endl;
    cout << " *          1: RECORD          *" << endl;
    cout << " *          2: DISPLAY          *" << endl;
    cout << " *          3: QUERY           *" << endl;
    cout << " *          4: INSERT          *" << endl;
    cout << " *          5: DELETE          *" << endl;
    cout << " *          6: SORT            *" << endl;
    cout << " *          0: QUIT            *" << endl;
    cout << " *****" << endl;
}

void readFromFile(){
    ifstream ifs( fileName, ios_base::in );
    int i = 0;
    while( !ifs.eof() ){
        ifs >> marks[i];
        ++ i;
    }
    Nrec = i - 1; //
    ifs.close();
}

```

```

void saveToFile(){
    ofstream ofs( fileName, ios_base::trunc );
    int i = 0;
    while( i < Nrec ){
        ofs << marks[i] << ' ';
        ++ i;
    }
    ofs.close();
}

void record(){
    int i = Nrec;
    int m;
    cout << "Enter -1 to stop entering numbers: ";
    while( true ){
        cin >> m;
        if( -1 == m ){
            break;
        }
        marks[i] = m;
        ++ i;
    }
    cout << ( i - Nrec ) << " record(s) has(have) been added." << endl;
    Nrec = i;
    saveToFile();
    cout << endl;
}

void display(){
    cout << endl;
    cout << Nrec << " records found: ";
    for( int i = 0; i < Nrec; i ++ ){
        if( i % 10 == 0 ){
            cout << endl;
        }
        cout << marks[i] << ' ';
    }
    cout << endl << endl;
}

void query(){

```

```

    int id;
    cout << "Enter the ID(1~" << Nrec << ") of the record: ";
    cin >> id;
    if( id > Nrec ){
        cout << "No such a record. ID should be less than (or equal to) " << Nrec << endl;
    }
    else{
        -- id;
        cout << "Found the record: " << marks[id] << endl;
    }
    cout << endl;
}

void insert(){
    int id;
    int m;
    cout << "Enter the ID(1~" << Nrec << ") in front of which you wanna insert the mark: ";
    cin >> id;
    cout << "Enter the mark: ";
    cin >> m;
    if( id > Nrec ){
        cout << "No such a record. ID should be less than (or equal to) " << Nrec << endl;
    }
    else{
        -- id;
        for( int i = Nrec+1; i > id; i -- ){
            marks[i] = marks[i-1];
        }
        marks[id] = m;
        ++ Nrec;
        cout << "The record has been inserted succussfully" << endl;
        saveToFile();
    }
    cout << endl;
}

void mydelete(){
    int id;
    cout << "Enter the ID(1~" << Nrec << ") of the record: ";
    cin >> id;
    if( id > Nrec ){
        cout << "No such a record. ID should be less than (or equal to) " << Nrec << endl;
    }

```

```

}
else{
    cout << "Found the record. Deleting..." << endl;
    -- id;
    for( int i = id; i < Nrec; i ++ ){
        marks[i] = marks[i+1];
    }
    -- Nrec;
    cout << "Successfully deleted the record." << endl;
    saveToFile();
}
cout << endl;
}

void sort(){
    cout << "Sorting..." << endl;
    int marks_cp[100];
    for( int i = 0; i < Nrec; i ++ ){
        marks_cp[i] = marks[i];
    }
    for( int j = 1; j < Nrec; j ++ ){
        int key = marks_cp[j];
        int i = j - 1;
        while( i >= 0 && marks_cp[i] > key ){
            marks_cp[i+1] = marks_cp[i];
            -- i;
        }
        marks_cp[i+1] = key;
    }
    cout << "Sorted marks: " << endl;
    for( int i = 0; i < Nrec; i ++ ){
        if( i % 10 == 0 ){
            cout << endl;
        }
        cout << marks_cp[i] << ' ';
    }
    cout << endl << endl;
}

```

III. 运行结果

mark.txt 内容为: 60 80 30 89 50 46 80 90 30 80 95 55 70 86 70 34 89 78 34 65

```
***** Main Menu *****
*      1: RECORD      *
*      2: DISPLAY     *
*      3: QUERY        *
*      4: INSERT       *
*      5: DELETE       *
*      6: SORT         *
*      0: QUIT         *
*****
```

Do your choice:

2

17 records found:

60 80 30 89 50 46 80 90 30 80

95 55 70 86 70 34 89

```
***** Main Menu *****
*      1: RECORD      *
*      2: DISPLAY     *
*      3: QUERY        *
*      4: INSERT       *
*      5: DELETE       *
*      6: SORT         *
*      0: QUIT         *
*****
```

Do your choice:

1

Enter -1 to stop entering numbers: 78 34 65 -1

3 record(s) has(have) been added.

```
***** Main Menu *****
*      1: RECORD      *
*      2: DISPLAY     *
*      3: QUERY        *
*      4: INSERT       *
*      5: DELETE       *
*      6: SORT         *
*      0: QUIT         *
*****
```

Do your choice:

2

20 records found:

60 80 30 89 50 46 80 90 30 80

95 55 70 86 70 34 89 78 34 65

***** Main Menu *****

* 1: RECORD *

* 2: DISPLAY *

* 3: QUERY *

* 4: INSERT *

* 5: DELETE *

* 6: SORT *

* 0: QUIT *

Do your choice:

3

Enter the ID(1~20) of the record: 4

Found the record: 89

***** Main Menu *****

* 1: RECORD *

* 2: DISPLAY *

* 3: QUERY *

* 4: INSERT *

* 5: DELETE *

* 6: SORT *

* 0: QUIT *

Do your choice:

4

Enter the ID(1~20) in front of which you wanna insert the mark: 4

Enter the mark: 55

The record has been inserted succussfully

***** Main Menu *****

* 1: RECORD *

* 2: DISPLAY *

* 3: QUERY *

* 4: INSERT *

* 5: DELETE *

* 6: SORT *

* 0: QUIT *

Do your choice:

2

21 records found:

60 80 30 55 89 50 46 80 90 30

80 95 55 70 86 70 34 89 78 34

65

***** Main Menu *****

* 1: RECORD *

* 2: DISPLAY *

* 3: QUERY *

* 4: INSERT *

* 5: DELETE *

* 6: SORT *

* 0: QUIT *

Do your choice:

5

Enter the ID(1~21) of the record: 4

Found the record. Deleting...

Successfully deleted the record.

***** Main Menu *****

* 1: RECORD *

* 2: DISPLAY *

* 3: QUERY *

* 4: INSERT *

* 5: DELETE *

* 6: SORT *

* 0: QUIT *

Do your choice:

2

20 records found:

60 80 30 89 50 46 80 90 30 80

95 55 70 86 70 34 89 78 34 65

***** Main Menu *****

* 1: RECORD *

* 2: DISPLAY *

```
*      3: QUERY      *
*      4: INSERT     *
*      5: DELETE     *
*      6: SORT       *
*      0: QUIT       *
```

Do your choice:

6

Sorting...

Sorted marks:

30 30 34 34 46 50 55 60 65 70

70 78 80 80 80 86 89 89 90 95

***** Main Menu *****

```
*      1: RECORD     *
*      2: DISPLAY     *
*      3: QUERY       *
*      4: INSERT      *
*      5: DELETE      *
*      6: SORT        *
*      0: QUIT        *
```

Do your choice:

0
