#include<iostream>

#include <string>

#include<iomanip>

using namespace std;

class StudentData

{//建立学生类

public:

string name; double average;

double math, english, chinese, number;

StudentData\* next;

StudentData\* pre;

void insertdate()

{

cin >> chinese >> math >> english ;

}

void setlang() { cin >> chinese; }

void setmath() { cin >> math; }

void setenglish() { cin >> english; }//输入各科成绩

};

struct linklist

{//带头指针和尾指针的双向链表

StudentData\* head, \* present;//头指针和当前指针

void insert\_one();

void delete\_data();

void setdata();

bool check();

void creat();

void output();

void setmore();

void averagerank();

}X;

void linklist::output()

{//打印链表，输出学生信息

cout << " 姓名 学号 语文 数学 英语 平均分" << endl;

present = head;

while (present->next != NULL)

{//不取尾结点，尾节点为空

present->average = (present->chinese + present->math + present->english ) / 3;

cout << setw(12) << present->name << setw(12) << present->number << setw(8) << present->chinese << setw(8) << present->math << setw(8) << present->english

<< setw(16) << present->average << endl;

present = present->next;

}

}

void linklist::creat()

{//创建空结点

present = new StudentData;

head = present;

present->next = NULL;

present->pre = NULL;

}

void linklist::insert\_one()

{

present = new StudentData;

head->pre = present;

present->next = head;

head = present;

present->pre = NULL;//新加一个学生数据加在表头

cout << "请输入学生姓名: ";

cin >> present->name;

cout << "请输入学号：";

cin >> present->number;

cout << "请一次输入语文，数学，英语各科成绩：" << endl;

present->insertdate(); //输入成绩

}

void linklist::delete\_data()

{//删除学生信息

//string studentnam;

int sigh = 0;

cout << "请输入要删除的学生学号： ";

if (check())

{

if (present->pre == NULL)

{

head = present->next;

delete present;

present = head;

}

if (present->pre != NULL)

{

present->pre->next = present->next;

present->next->pre = present->pre;

head = present->pre;

delete present;

}

cout << "删除数据成功！" << endl;

}

else cout << "删除失败。" << endl;

}

bool linklist::check()

{//按学号查找并输出学生信息

present = head;

int idnumber;

cin >> idnumber;

while (present->next != NULL)

{

if (idnumber == present->number)

{

present->average = (present->chinese + present->math + present->english ) / 3;

cout << " 姓名 学号 语文 数学 英语 平均分" << endl;

cout << setw(12) << present->name << setw(12) << present->number << setw(8) << present->chinese << setw(8) << present->math << setw(8) << present->english

<< setw(16) << present->average << endl;

return true;

}

else

{

present = present->next;

continue;

}

}

cout << "查无此人！" << endl;

return false;

}

void linklist::setdata()

{//修改学生成绩

int subject;

cout << "请输入学生的学号: ";

if (check())

{

while (1)

{//设置个循环修改成绩，按0或者超出选项退出循环

cout << " 1.语文 2.数学" << endl

<< " 3.英语 "<<endl

<< " 0.返回上级菜单 " << endl;

cout << "请输入需要修改的科目编号及成绩: ";

cin >> subject;

switch (subject)

{

case 1:present->setlang(); break;

case 2:present->setmath(); break;

case 3:present->setenglish(); break;

case 0:cout << "回到上级菜单" << endl;; return;

default:

{

cout << "回到上级菜单。" << endl;//这行可以不要

return;

}

}

cout << "修改成功！" << endl;

}

}

}

void linklist::setmore()

{//通过循环次数来控制插入人数

cout << "请输入添加学生人数： ";

int n;

cin >> n;

while (n--) insert\_one();

}

void linklist::averagerank()

{//注意链表的尾结点是默认值，因为在创建链表的时候是在空节点上逆序创建的

int h = 0, k = 0; present = head;

L:

while (present->next->next != NULL)

{

h = k;

if (present->average <= present->next->average)

{

present = present->next;

}//无需互换

if (present->average > present->next->average && present->pre == NULL)

{

k++;

present->next = present->next->next;

present->next->pre->next = present;

present->pre = present->next->pre;

present->next->pre = present;

present->pre->pre = NULL;

}//头节点处链表间互换

if (present->average > present->next->average && present->pre != NULL)

{

if (present->next->next != NULL)

{//最后一个空结点不纳入考虑

k++;

present->pre->next = present->next;

present->next = present->next->next;

present->pre->next->next = present;

present->pre->next->pre = present->pre;

present->pre = present->pre->next;

present->next->pre = present;

}

}

while (h != k)

{//若一次完整循环下来没有顺序变化，退出

while (present->pre != NULL) { present = present->pre; } goto L;

}

}

while (present->pre != NULL) { present = present->pre; }

head = present;//因为头结点不为空，修改完后可能会被改变，此处从新定位头结点

cout << " 姓名 学号 语文 数学 英语 平均分" << endl;

do {

present->average = (present->chinese + present->math + present->english ) / 3;

cout << setw(12) << present->name << setw(12) << present->number << setw(8) << present->chinese << setw(8) << present->math << setw(8) << present->english

<< setw(16) << present->average << endl;

present = present->next;

} while (present->next != NULL);

}

int main()

{

cout << " " << endl;

cout << " 学生信息管理系统 " << endl;

cout << " " << endl;

cout << " 1.添加一个学生信息 2.查询学生信息" << endl;

cout << " 3.删除学生信息 4.将学生信息列表输出" << endl;

cout << " 5.修改学生成绩 6.批量输入任意个数学生信息" << endl;;

cout << " 7.按各门成绩平均分进行排序 0.退出系统 " << endl;

cout << " " << endl;

X.creat();//先建空表

while (true) {

int choise;

cout << endl << "请输入相应操作序号： ";

cin >> choise;

switch (choise)

{

case 1: X.insert\_one(); break;

case 2:

{

cout << "请输入查询学生的学号： ";

X.check(); break;

}

case 3: X.delete\_data(); break;

case 4: X.output(); break;

case 5: X.setdata(); break;

case 6: X.setmore(); break;

case 7: X.averagerank(); break;

case 0:

break;

default:

cout << "对不起，有关功能正在开发！" << endl; break;

}

if (!choise) break;

}

return 0;

}