#ifndef _STUDENT_H
#define _STUDENT_H

/** base-class for a generic student
 *  Owen Astrachan for CPS 100,
 *  Spring 1996, revised Fall 1997, revised Spring 2000
 *  Revised Fall 2000
 *  * Student("name") -- constructs a student with given name
 *  * void live() -- consists of eat(), work(), sleep()
 *  * these functions, all virtual, print a message
 *  * and cause energy to be lost (Work) or gained (Eat/Sleep)
 *  * bool isAlive() -- returns true if alive, else false
 *  * (alive if energy > 0)
 *  * string name() -- returns name of student
 *  * int energy() -- returns energy level
 *  * NOTE: there are some bad design decisions in this class */

#include <string>
using namespace std;

class Student
{
  public:
    Student(const string & name);
    virtual ~Student();

    virtual void eat();
    virtual void work();
    virtual void sleep();
    virtual void live();

    bool isAlive() const;
    virtual string name() const;
    int energy() const;

  protected:

    string myName;
    int myEnergy;
};

#endif
```cpp
#include <iostream.h>
#include "students.h"

class DukeStudent : public Student
{
    public:
        DukeStudent(const string & name);
    virtual void play();
    virtual void eat();
    virtual void live();
    virtual string name() const;
};
class CosmicStudent : public DukeStudent
{
    public:
        CosmicStudent(const string & s);
    virtual void eat();
};

void CosmicStudent::eat()
{
    myEnergy += 10;
    cout << "yum yum, burritos" << endl;
}
CosmicStudent::CosmicStudent(const string & name)
    : DukeStudent(name)
{
}
DukeStudent::DukeStudent(const string & name)
    : Student(name)
{
}
void DukeStudent::play()
{
    myEnergy -= 10;
    cout << "work hard/play hard" << endl;
}
void DukeStudent::eat()
{
    cout << "chick fil'a-gain!!" << endl;
    Student::eat();
}
void DukeStudent::live()
{
    Student::live();
    play();
}

string DukeStudent::name() const
{
    return "Duke" + Student::name();
}

void DoSchool(Student *s)
// goto school
{
    cout << "Starting up with " << s->name() << endl << endl;
    while (s->isAlive())
    {
        cout << endl << s->name() << " energy = " << s->energy() << endl;
        s->live();
    }
}

int main()
{
    Student * normal = new Student("Pat");
    Student * duke = new DukeStudent("Chris");
    Student * cosmic = new CosmicStudent("Sam");

    DoSchool(normal);
    DoSchool(duke);
    DoSchool(cosmic);

    delete normal;
    delete duke;
    delete cosmic;

    return 0;
}
```

```cpp
#include <iostream>
using namespace std;

#include "students.h"

Student::Student(const string & name)
    : myName(name),
      myEnergy(100)
{    // work done in initializer list
}

Student::~Student()
{    // nothing needed, no dynamic memory allocated
}

void Student::eat()
{    myEnergy += 5;
    cout << "Pizza! yum yum, glurp, gobble, burp" << endl;
}

void Student::work()
{    myEnergy -= 20;
    cout << "study study ... panic ... study" << endl;
}

void Student::sleep()
{    myEnergy += 10;
    cout << "Zzzzzzzzzzzzz, resting sleep" << endl;
}

void Student::live()
{    eat();
    work();
    sleep();
}

bool Student::isAlive() const
{    return myEnergy > 0;
}

string Student::name() const
{    return myName;
}

int Student::energy() const
{    return myEnergy;
}
```

```
Starting up with Pat

Pat: energy = 100
Pizza! yum yum, glurp, gobble, burp
study study ... panic ... study
Zzzzzzzzzzzz, resting sleep

Pat: energy = 95
Pizza! yum yum, glurp, gobble, burp
study study ... panic ... study
Zzzzzzzzzzzzz, resting sleep

Pat: energy = 90
Pizza! yum yum, glurp, gobble, burp
study study ... panic ... study
Zzzzzzzzzzzzz, resting sleep

entries here removed 85, 80, 75, 70, 65, 60, 55, ..., 20, 15

Pat: energy = 10
Pizza! yum yum, glurp, gobble, burp
study study ... panic ... study
Zzzzzzzzzzzzz, resting sleep

Pat: energy = 5
Pizza! yum yum, glurp, gobble, burp
study study ... panic ... study
Zzzzzzzzzzzzz, resting sleep

Starting up with Duke Chris

// *******************************************************
Duke Chris: energy = 100
chick fil’ a-gain!!
Pizza! yum yum, glurp, gobble, burp
study study ... panic ... study
Zzzzzzzzzzzzz, resting sleep
work hard/play hard

Duke Chris: energy = 85
chick fil’ a-gain!!
Pizza! yum yum, glurp, gobble, burp
study study ... panic ... study
Zzzzzzzzzzzzz, resting sleep
work hard/play hard

entries here removed 70, 55, 40

Duke Chris: energy = 25
chick fil’ a-gain!!
Pizza! yum yum, glurp, gobble, burp
study study ... panic ... study
Zzzzzzzzzzzzz, resting sleep
work hard/play hard

Duke Chris: energy = 10
chick fil’ a-gain!!
Pizza! yum yum, glurp, gobble, burp
study study ... panic ... study
Zzzzzzzzzzzzz, resting sleep
work hard/play hard

Starting up with Duke Sam

// *******************************************************
Duke Sam: energy = 100
yum yum, burritos
study study ... panic ... study
Zzzzzzzzzzzzz, resting sleep
work hard/play hard

Duke Sam: energy = 90
yum yum, burritos
study study ... panic ... study
Zzzzzzzzzzzzz, resting sleep
work hard/play hard

entries here removed 80, 70, 60, 50, 40, 30

Duke Sam: energy = 20
yum yum, burritos
study study ... panic ... study
Zzzzzzzzzzzzz, resting sleep
work hard/play hard

Duke Sam: energy = 10
yum yum, burritos
study study ... panic ... study
Zzzzzzzzzzzzz, resting sleep
work hard/play hard

starting up with duke sam

// *******************************************************
Duke Sam: energy = 100
yum yum, burritos
study study ... panic ... study

print by owen l. astrachan

monday january 12, 2004