



C++语言基础

迂者 - 贺利坚

http://blog.csdn.net/sxhelijian/

http://edu.csdn.net



本节主题: 案例: Time类的设计



要做一个电子表!

□ 定义时间类

☆ 数据:时、分、秒

□ 动作:设置、调整、显示时间

□ 原型



```
class Time
public:
private:
  int hour;
  int minute;
  int sec;
};
```

```
Time();
Time(int, int, int);
void set_time();
void show_time();
void add_a_sec(); //增加1秒钟
void add_a_minute(); //增加1分钟
void add_an_hour(); //增加1小时
```



Time类的初步实现与测试

```
class Time
public:
  Time():hour(0), minute(0), sec(0){};
  Time(int h, int m, int s):hour(h), minute(m), sec(s){};
  void set time();
  void show time();
  void add_a_sec(); //增加1秒钟
  void add a minute(); //增加1分钟
  void add an hour(); //增加1小时
private:
 int hour;
  int minute;
  int sec;
```

```
void Time::show_time( )
{
   cout<<hour<<":"<<minute<<":"<<sec<<endl;
}</pre>
```

```
void Time::set_time()
{
   cin>>hour>>minute>>sec;
}
```

```
0:0:0
34 45 27
34:45:27
8:20:50
```

```
int main()
  Time t1;
 t1.show_time();
 t1.set time();
 t1.show time();
  Time t2(8,20,50);
 t2.show_time();
  return 0;
```



Time中时间调整功能的实现与测试

```
class Time
public:
  Time():hour(0), minute(0), sec(0){};
  Time(int h, int m, int s):hour(h), minute(m), sec(s){};
  void set time();
  void show time();
  void add a sec(); //增加1秒钟
  void add_a_minute(); //增加1分钟
  void add an hour(); //增加1小时
private:
                             ■ D:\...
  int hour:
                             8:20:51
  int minute;
                             8:21:0
  int sec;
```

```
void Time::add_an_hour()
{
    ++hour;
    if (hour>23)
     hour=0;
}
```

```
void Time::add_a_minute()
{
    ++minute;
    if (minute>59)
    {
        minute=0;
        add_an_hour();
    }
}
```

```
void Time::add_a_sec()
{
    ++sec;
    if (sec>59)
    {
        sec=0;
        add_a_minute();
    }
}
```

```
int main()
{
    Time t1(8,20,50);
    t1.add_a_sec();
    t1.show_time();
    Time t2(8,20,59);
    t2.add_a_sec();
    t2.show_time();
    return 0;
}
```



这样测试更有效!

```
class Time
public:
  Time():hour(0), minute(0), sec(0){};
  Time(int h, int m, int s):hour(h), minute(m), sec(s){};
  void set time();
  void show time();
  void add a sec(); //增加1秒钟
  void add_a_minute(); //增加1分钟
  void add an hour(); //增加1小时
private:
  int hour;
  int minute;
  int sec;
```

```
int main()
  int i:
  Time t1(8,20,50);
  for(i=0; i<20; i++)
    t1.add a sec();
    t1.show time();
  Time t2(10,56,50);
  for(i=0; i<10; i++)
    t2.add a minute();
    t2.show time();
  Time t3(21,20,50);
  for(i=0; i<10; i++)
    t3.add an hour();
    t3.show time();
  return 0;
```

```
■ D:\C... - □ ×
8:20:56
8:20:57
8:20:58
8:20:59
8:21:0
8:21:1
8:21:2
8:21:3
8:21:4
8:21:5
8:21:6
8:21:7
8:21:8
8:21:9
8:21:10
10:57:50
10:58:50
10:59:50
11:0:50
11:1:50
11:2:50
11:3:50
11:4:50
11:5:50
11:6:50
22:20:50
23:20:50
0:20:50
1:20:50
2:20:50
3:20:50
```



用单步更灵活的测试!

```
class Time
public:
                                                              结合在单步执行中观
  Time():hour(0), minute(0), sec(0){};
                                                              察窗口修改变量的值
  Time(int h, int m, int s):hour(h), minute(m), sec(s){};
  void set time();
  void show time();
                                          Watches (new)
                                                                *main.cpp ×
                                            Function argur
  void add_a_sec(); //增加1秒钟
                                                                   56
                                          E Locals
                                                                   57
                                                                         int main( )
                                            □ t1
  void add a minute(); //增加1分钟
                                                                   58
                                               hour
                                                                             int debug=1;
                                                                   59
                                                    20
                                               minute
                                                                             Time t1(8,20,50);
  void add an hour(); //增加1小时
                                                                   60
                                               sec
                                                                             while (debug)
                                                                   61
                                             debug
private:
                                            t1.hour
                                                                   63
                                                                                t1.add a sec();
                                            t1.sec
                                                          int
  int hour;
                                            t1.minute
                                                          int
                                                                             debug=1;
                                                        ...
                                                          int
                                            debug
                                                                   66
                                                                             while (debug)
  int minute;
                                                                   67
                                                                   68
                                                                                t1.add a minute
  int sec:
                                                                   69
                                                                             debug=1;
                                                                   70
                                                                             while (debug)
```

```
int main()
  int debug=1;
  Time t1(8,20,50);
  while(debug)
    t1.add a sec();
  debug=1;
  while(debug)
    t1.add a minute();
  debug=1;
  while(debug)
    t1.add an hour();
  return 0;
```

Time类的完善:增加调整时间的方式

```
class Time
public:
 Time(): hour(0), minute(0), sec(0) {}
 Time(int h, int m, int s):hour(h), minute(m), sec(s) {}
 void set time();
 void show time();
 void add a sec(); //增加1秒钟
 void add a minute(); //增加1分钟
 void add an hour(); //增加1小时
 void add seconds(int); //增加n秒钟
 void add minutes(int); //增加n分钟
 void add hours(int); //增加n小时
                                  ■ D... - □ ×
private:
                                 21:33:25
 int hour;
                                 23:40:25
 int minute;
                                 7:40:25
 int sec;
```

```
void Time::add_hours(int n)
{
  hour+=n;
  if (hour>23)
   hour%=24;
}
```

```
int main()
{
    Time t1(21, 32, 45);
    t1.add_seconds(40);
    t1.show_time();
    t1.add_minutes(127);
    t1.show_time();
    t1.add_hours(8);
    t1.show_time();
    return 0;
}
```

```
void Time::add_minutes(int n)
{
    minute+=n;
    if (minute>59)
    {
       add_hours(minute/60);
       minute%=60;
    }
}
```

```
void Time::add_seconds(int n)
{
    sec+=n;
    if (sec>59)
    {
        add_minutes(sec/60);
        sec%=60;
    }
}
```



Time类的完善:录入中的格式和数据成员数值限制

```
class Time
                                                   bool Time::is time(int h,int m, int s)
                                                     if (h<0 ||h>24 || m<0 ||m>60 || s<0 ||s>60)
public:
                                                       return false:
 Time(): hour(0), minute(0), sec(0) {}
                                                     return true;
 Time(int h, int m, int s):hour(h), minute(m), sec(s) {}
 void set_time( );
 void show time();
                                          int main()
 void add a sec(); //增加1秒钟
                                            Time t1:
 void add a minute(); //增加1分钟
                                            t1.set time();
 void add an hour(); //增加1小时
                                            t1.show time();
 void add seconds(int); //增加n秒钟
                                            return 0;
 void add minutes(int); //增加n分钟
 void add hours(int); //增加n小时
private:
                            D:\CPP\codeBlock\examp...
 bool is_time(int, int, int);
                            请输入时间(格式hh:mm:ss)34:23:56
 int hour;
                            时间非法,请重新输入
 int minute;
                            23, 34, 59
                            格式不正确,请重新输入
 int sec;
                            12:15:34
};
                            12:15:34
```

```
void Time::set time()
 char c1,c2;
 cout<<"请输入时间(格式hh:mm:ss)";
 while(1)
   cin>>hour>>c1>>minute>>c2>>sec;
   if(c1!=':'||c2!=':')
     cout<<"格式不正确,请重新输入"<<endl:
   else if (!is time(hour,minute,sec))
     cout<<"时间非法,请重新输入"<<endl;
   else
     break;
```





THANKS

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