برنامه نویسی پیشرفته
C#

۳۱ شهریور

ملکی مجد

معرفی درس

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- Room 307
- Course page
  - Telegram “IUST AP98991”
  - quera
- References:
  - Books!
  - Google
  - Prof. and TAs

- نمره دهی
  - میان ترم و پایان ترم ۱۱. تمرین ها و پروژه ۷ . مشارکت کلاسی ۲
- تقلب قابل قبول نیست
- میان ترم ۳ آذر !

درس برنامه نویسی پیشرفته

- پیشرفته یعنی چی؟
- چی می خواهیم یاد بگیریم؟
- چرا C#؟

کلید یادگیری برنامه نویسی

- تمرین
- مطالعه
- پافشاری

مقدمه

- کامپیوتر
- نرم افزار و سخت افزار
- داده و اطلاعات
- برنامه های کاربردی پردازش داده

- مهندس نرم افزار
- برنامه نویس

از مسئله تا برنامه

- حل مسئله

- اشتباه
  - آیا واقعا صورت مسئله را به درستی فهمیده ام

یک برنامه ساده

- محاسبه هزینه پنجره دوجداره
- مشخصات مسئله
- ابرداده metadata

glass area = width of window * height of window

wood length = (width of window + height of window) * 2

The width of the window, in metres and being a value between 0.5 Metres and 3.5 metres inclusive.

in square metres, double glazing, so two panes

The height of the window, in metres and being a value between 0.5 metres and 2.0 metres inclusive.

given in feet using the conversion factor of 3.25 feet per metre.

اثبات درستی برنامه

“If I give the above program the inputs 2 metres high and 1 metre wide the program should tell me I need 4 square metres of glass and 19.5 feet of wood.”

- همه وضعیت های ممکن شامل وضعیت های خطا
- نوشتن تست پیش از نوشتن برنامه

تعامل با کاربر

read in the width

verify the value

read in the height

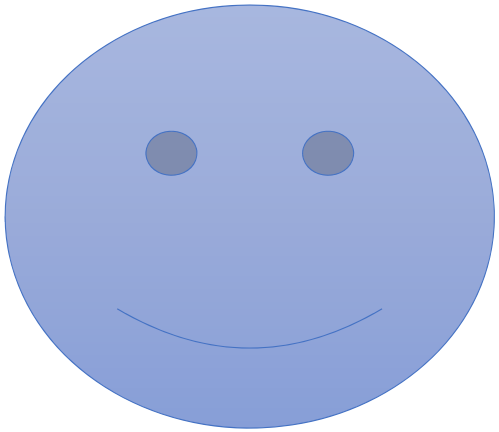
verify the value

calculate width times height times 2 and print it

calculate (width + height) * 2 * 3.25 and print it

- Compiler
- Variable
- Data Type
- Statement
- Method
- Identifiers and Keywords

```
using System;

class GlazerCalc
{
	static void Main()
	{
		double width, height, woodLength, glassArea;
		string widthString, heightString;

		widthString = Console.ReadLine();
		width = double.Parse(widthString);

		heightString = Console.ReadLine();
		height = double.Parse(heightString);

		woodLength = 2 * ( width + height ) * 3.25 ;

		glassArea = 2 * ( width * height ) ;

		Console.WriteLine ( "The length of the wood is " +
			woodLength + " feet" ) ;
		Console.WriteLine( "The area of the glass is " +
			glassArea + " square metres" ) ;
	}
}
```



```
using System;class GlazerCalc{static void Main(){double width, height,
woodLength, glassArea;string widthString, heightString;widthString =
Console.ReadLine();width = double.Parse(widthString);heightString =
Console.ReadLine();height = double.Parse(heightString);woodLength = 2 * ( width
+ height ) * 3.25 ;glassArea = 2 * ( width * height ) ;Console.WriteLine (
"The length of the wood is " + woodLength + " feet" ) ;Console.WriteLine(
"The area of the glass is " + glassArea + " square metres" ) ;}}
```

نوشتن برنامه

- اسم گذاری مناسب و خوانا
- Layout
- کامنت
  - مشابه C

Data Types

- Widening and Narrowing
  - Casting
- Types of data in expressions

تمرین

- کمک به دوست شیمی دان
  - محاسبه تعداد قوطی ها لازم برای نگهداری قرص ها. ظرفیت هر قوطی ۱۰۰.

روند برنامه (flow)

1.
2.
3.

روند برنامه (flow)

- ترتیبی (خط مستقیم)
- انتخاب با توجه به شرط داده شده
- تکرار با در نظر گرفتن درستی یک شرط

- مسیری را که یک برنامه دنبال می کند "thread of execution" می نامند.

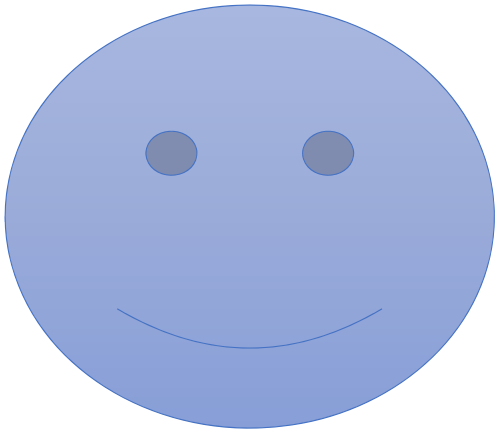
مشابه C :

- if
- while
- for
- break - continue
- relational operators == != < > <= >= !
- Logical operators && ||
- const
- ++ -- += -=

مدیریت ورودی نامناسب در مثال glazer

```
using System;

class GlazerCalc
{
        static void Main()
        {
                double width, height, woodLength, glassArea;
                string widthString, heightString;

                widthString = Console.ReadLine();
                width = double.Parse(widthString);

                heightString = Console.ReadLine();
                height = double.Parse(heightString);

                woodLength = 2 * ( width + height ) * 3.25 ;

                glassArea = 2 * ( width * height ) ;

                Console.WriteLine ( "The length of the wood is " +
                        woodLength + " feet" ) ;
                Console.WriteLine( "The area of the glass is " +
                        glassArea + " square metres" ) ;
        }
}
```

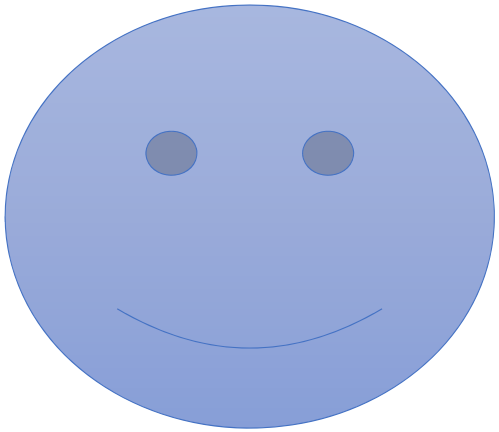
```
const double MAX_WIDTH = 5.0 ;
const double MIN_WIDTH = 0.5 ;
const double MAX_HEIGHT = 3.0 ;
const double MIN_HEIGHT = 0.75 ;

if (width < MIN_WIDTH) {
        Console.WriteLine ( "Width is too small.\n\n " ) ;
        Console.WriteLine ( "Using minimum" ) ;
        width = MIN_WIDTH ;
}

if (width > MAX_WIDTH) {
        Console.WriteLine ( "Width is too large.\n\n" ) ;
        Console.WriteLine ( "Using maximum" ) ;
        width = MAX_WIDTH ;
}
```



تکمیل برنامه glazer

- گرفتن ورودی درست از کاربر

```
do {
        Console.Write ( "Give the width of the window between " +
                MIN_WIDTH + " and " + MAX_WIDTH + " :"  );
        widthString = Console.ReadLine();
        width = double.Parse(widthString);
} while ( width < MIN_WIDTH ||  width > MAX_WIDTH ) ;

do {
        Console.Write ( "Give the height of the window between " +
                MIN_HEIGHT + " and " + MAX_HEIGHT + " :"  );
        heightString = Console.ReadLine();
        height = double.Parse(heightString);
} while ( height < MIN_HEIGHT || height > MAX_HEIGHT );
```



ذخیره متن

- String
  - \
  - @

Using placeholders چاپ مرتب در خروجی

```
int i = 150 ;
double f = 1234.56789 ;
Console.WriteLine ( "i: {0} f: {1}", i, f ) ;
Console.WriteLine ( "i: {1} f: {0}", f, i ) ;
```

This would print out:

```
i: 150 f: 1234.56789
i: 150 f: 1234.56789
```

- فصل اول و دوم کتاب begin to code with c#

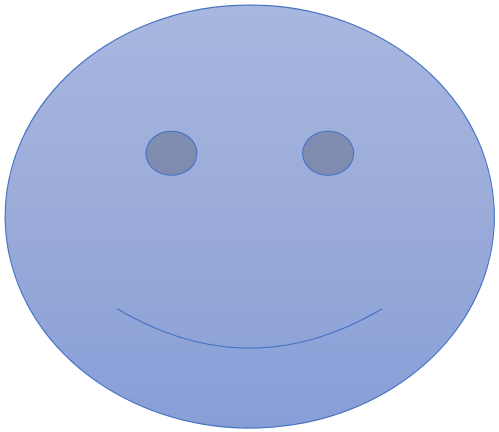
Method

- Example : Main readline writeline

- برای قسمتی از کد اسم می گذاریم و از آن چندین دفعه استفاده می کنیم
- متد ها:
  - شما برای انجام قسمتی از برنامه نوشتید
  - دیگران نوشته اند و شما استفاده می کنید

- سودمندی
  - استفاده مجدد از کد
  - شکستن یک کار بزرگ به بخش های کوچکتر

Code sample 12



Method - parameters

- پارامتر: روشی برای فرستادن داده به متد

```
using System ;

class MethodDemo
{
    static void silly ( int i )
    {
        Console.WriteLine ( "i is : " + i ) ;
    }

    public static void Main ()
    {
        silly ( 101 ) ;
        silly ( 500 ) ;
    }
}
```

```
using System ;

class MethodDemo
{
    static void silly ( int i )
    {
        Console.WriteLine ( "i is : " + i ) ;
    }

    public static void Main ()
    {
        silly ( 101 ) ;
        silly ( 500 ) ;
    }
}
```

:return value

```
using System ;

class ReturnDemo
{
    static int sillyReturnPlus ( int i )
    {
        i = i + 1;
        Console.WriteLine ( "i is : " + i ) ;
        return i;
    }

    public static void Main ()
    {
        int res;
        res = sillyReturnPlus (5);
        Console.WriteLine ( "res is : " + res ) ;
    }
}
```

```
using System ;

class ReturnDemo
{
    static int sillyReturnPlus ( int i )
    {
        i = i + 1;
        Console.WriteLine ( "i is : " + i ) ;
        return i;
    }

    public static void Main ()
    {
        int res;
        res = sillyReturnPlus (5);
        Console.WriteLine ( "res is : " + res ) ;
    }
}
```

Parameter

Argument

```
static double readValue (
    string prompt, // prompt for the user
    double low,    // lowest allowed value
    double high    // highest allowed value
    )
{
    double result = 0;
    do
    {
        Console.WriteLine (prompt +
            " between " + low +
             " and " + high );
        string resultString = Console.ReadLine ();
        result = double.Parse(resultString);
    } while ( (result < low) || (result > high) );
    return result ;
}
```

```
static double readValue (
    string prompt, // prompt for the user
    double low,    // lowest allowed value
    double high    // highest allowed value
    )
{
    double result = 0;
    do
    {
        Console.WriteLine (prompt +
            " between " + low +
             " and " + high );
        string resultString = Console.ReadLine ();
        result = double.Parse(resultString);
    } while ( (result < low) || (result > high) );
    return result ;
}
```

```
static double readValue (
    string prompt, // prompt for the user
    double low,    // lowest allowed value
    double high    // highest allowed value
    )
{
    double result = 0;
    do
    {
        Console.WriteLine (prompt +
            " between " + low +
             " and " + high );
        string resultString = Console.ReadLine ();
        result = double.Parse(resultString);
    } while ( (result < low) || (result > high) );
    return result ;
}
```

```
double windowWidth = readValue (
      "Enter width of window: ", MIN_WIDTH, MAX_WIDTH) ;

double age = readValue ( "Enter your age: ", 0, 70) ;
```

```
static double readValue (
    string prompt, // prompt for the user
    double low,    // lowest allowed value
    double high    // highest allowed value
    )
{
    double result = 0;
    do
    {
        Console.WriteLine (prompt +
           " between " + low +
            " and " + high );
        string resultString = Console.ReadLine ();
        result = double.Parse(resultString);
    } while ( (result < low) || (result > high) );
    return result ;
}
```

Optional argument

- Default value

```
static double readValue (
    string prompt,  // prom
    double low,     // lowe
    double high     // high
    )
{
    double result = 0;
    do
    {
        Console.WriteLine (p
            " between " + low
             " and " + high );
        string resultString = Console.ReadLine ();
        result = double.Parse(resultString);
    } while ( (result < low) || (result > high) );
    return result ;
}
```

```
static double readValue (
    double low,              //
    double high,             //
    string prompt = "",      //
    )
{
    ...
}
```

```
x = readValue(25, 100);
```

```
static double readValue(
    double low,    // lowest allowed value
    double high,    // highest allowed value
    string prompt = "", // optional prompt for the user
    string error = "" // optional error message
)
{
    ...
}
```

```
x = readValue(25, 100, "Enter your age", "Age out of range");
```

```
static double readValue(
    double low,    // lowest allowed value
    double high,    // highest allowed value
    string prompt = "", // optional prompt for the user
    string error = "" // optional error message
)
{
    ...
}
```

```
x = readValue(25, 100, error:"Age out of range");
```

Method – parameter passing

- passing parameters by value
  - Safe + limitation

Method – parameter passing

- passing parameters by value
  - Safe + limitation

```
int test = 20 ;
addOne(test);
Console.WriteLine ( "test is : " + test ) ;
```

```
static void addOne ( int i )
{
    i = i + 1;
    Console.WriteLine ( "i is : " + i ) ;
}
```

Method – parameter passing

- passing parameters by value
  - Safe + limitation
- Parameter Passing By Reference
  - Keyword ref

Method – parameter passing

- Parameter Passing By Reference
  - Keyword ref

```
test = 20 ;
addOneToRefParam(ref test);
Console.WriteLine ( "test is : " + test ) ;
```

```
static void addOneToRefParam ( ref int i )
{
      i = i + 1;
      Console.WriteLine ( "i is : " + i ) ;
}
```

Method – parameter passing

- passing parameters by value
  - Safe + limitation
- Parameter Passing By Reference
  - Keyword ref
  - Keyword out

Method – parameter passing

- Parameter Passing By Reference
  - Keyword ref
  - Keyword out

```
string name ;
int age ;
readPerson ( out name, out age ) ;
```

```
static void readPerson ( out string name, out int age )
{
        name = readString ( "Enter your name : " ) ;
        age = readInt ( "Enter your age : ", 0, 100 ) ;
}
```

تمرین

- تمرین ۰
  - نصب Microsoft Visual Studio و نوشتن برنامه گفته شده (کامپایل + اجرا)

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