梁雅维 编著

Visual Basic

程序设计基础教程

双语版

An Introduction to Programming with Visual Basic

Bilingual Edition

清华大学出版社

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内 容 简 介

Abstract

本书以微软公司公开发布的免费版 Visual Basic 2008(简称 VB 2008)为工具,介绍了计算机程序设计的主要内容。第 1 章描述了 VB 2008 的综合程序设计环境和该语言的基础知识。第 2～4 章是计算机高级程序设计语言的通用知识。第 5 章讨论如何编写视窗类人机交互界面的程序。第 6 章引出事件驱动的程序设计概念。附录 A 中给出了本书的习题解答。附录 B 中给出了词汇索引。最新版的 VB 2010 与 VB 2008 大同小异。

This textbook uses Microsoft's freely available edition of Visual Basic 2008 (VB 2008 for short) as a tool to introduce the main contents of a computer programming course. The first chapter explains VB 2008 integrated programming environment and the language fundamentals. Chapters 2 to 4 cover common knowledge of high level computer programming languages. Chapter 5 illustrates how to program human-computer interface in Windows Applications. Chapter 6 explores the concept of event driven programming. The appendix A gives the solutions of all exercises in the textbook. The appendix B gives the index. The latest VB 2010 is very similar to VB 2008.

图书在版编目(CIP)数据

Visual Basic 程序设计基础教程：双语版/梁雅维编著．—北京：清华大学出版社，2010.10
ISBN 978-7-302-22485-3

Ⅰ．①V…　Ⅱ．①梁…　Ⅲ．①BASIC 语言－程序设计　Ⅳ．①TP312

中国版本图书馆 CIP 数据核字(2010)第 067735 号

责任编辑：焦　虹
责任校对：梁　毅
责任印制：杨　艳

出版发行：清华大学出版社　　**地　　址**：北京清华大学学研大厦 A 座
http://www.tup.com.cn　　**邮　　编**：100084
社　总　机：010-62770175　　**邮　　购**：010-62786544
投稿与读者服务：010-62795954，jsjjc@tup.tsinghua.edu.cn
质　量　反　馈：010-62772015，zhiliang@tup.tsinghua.edu.cn

印 装 者：北京嘉实印刷有限公司
经　　销：全国新华书店
开　　本：185×260　　**印　张**：7.75　　**字　数**：186 千字
版　　次：2010 年 10 月第 1 版　　**印　次**：2010 年 10 月第 1 次印刷
印　　数：1～3000
定　　价：18.00 元

产品编号：032687-01

前　言

Preface

2008年3月，微软公司取消了对Visual Basic 6(简称VB6)的支持，并推出了新的Visual Basic 2008 Express Edition免费版（简称VB 2008），它相当于VB .NET Framework 3.5 或者VB9。为了使学生更快地适应并使用新版VB学习计算机程序设计，作者根据在大学教授计算机程序设计基础课程的材料，特编写了这部简练的教材。

In March 2008, Microsoft stopped its support to Visual Basic 6 (VB6 for short), and it has a newer and free version in place, i.e., Visual Basic 2008 Express Edition (VB 2008 for short), it is equivalent to VB .NET Framework 3.5 or VB9. To help students quickly get used to the newer version of Visual Basic, the author prepares this concise textbook, which is based on the teaching materials of the first computer programming language course at university level.

本书可供第一次学习计算机程序设计课程的学生使用，无需其他先导课程。

This textbook can be used for the students who take computer programming course for the first time, it doesn't need any prerequisite computer programming course.

第1章介绍VB 2008的综合程序设计环境及其VB 2008程序设计语言的基础知识。

Chapter 1 is an introduction to VB 2008 integrated development environment and fundamentals of VB 2008 programming language.

第2章涵盖了VB 2008的各类完整命令的句法。

Chapter 2 covers syntaxes of how to write complete command in VB 2008.

第3章涉及一个特殊的数据结构，即：数组，介绍了如何使用数组。

Chapter 3 deals with a special data structure, i.e., arrays, and how to manipulate them.

第4章讨论使用子程序的模块化设计理念，也就是编写可供反复使用的相对独立的程序单元。

Chapter 4 expands our knowledge to sub-programs, a way of modularity, i.e., writing a code fragment in a relative independent way, so they can be used without being re-written.

第5章列举了各种常见的编写视窗应用程序的方法。

Chapter 5 studies various ways of writing programs in Windows format.

第6章介绍了事件驱动的程序设计概念。

Chapter 6 illustrates the concepts of event driven programming.

附录A中给出了1～6章的习题解答。附录B中给出了词汇索引。

The appendix A gives the solutions to exercises from Chapter 1 to Chapter 6. And Appendix B lists an index.

因为VB 2008是微软公司公开发布的免费版，所以选择本教材十分经济划算。本教材可供

下述人群使用。

Because VB 2008 is freely available, it is very economical to use this textbook. It can be used for the following groups of people.

- 第一次学习计算机程序设计的学生。
  Students who learn computer programming for the first time.
- 已经熟悉 VB6 并希望迅速掌握最新版的 VB 2008 的学生。
  Students who are familiar with VB6 and want to move to VB 2008.
- 选用汉英双语计算机教材的学生。
  Students who are willing to use a bilingual computer programming textbook.
- 参加全国计算机等级考试的考生。
  People who prepare national computer proficiency tests.
- 程序设计爱好者。
  Computer programming hobbyists.

这本书的编写方式十分紧凑，它应该是一座通往 VB 2008 更多知识的桥梁。读者通过对其内容的学习可引发对更多内容进行探究的兴趣。

This textbook is written in a very concise way, it means to be a bridge to more knowledge of VB 2008, and readers are encouraged to explore more by themselves.

最新版的 VB 2010 和 VB 2008 大同小异；本教材的所有实例和练习也可在 VB 2010 环境下运行。

The latest VB 2010 is very similar to VB 2008; all examples and exercises are tested in VB 2010 as well.

作者特别铭记上海中医药大学中英双语 VB 2008 试点班的同学们勇于接受挑战的笑脸。

The author specially remembers those smiling faces of the VB 2008 Bilingual Class at Shanghai University of Traditional Chinese Medicine (SHUTCM), which shows how they face challenges.

最后，作者衷心感谢上海中医药大学的张昌林、苏小英老师，他们在教学中给予了作者很多帮助。

Finally, I heartily wish to thank Professors Changlin Zhang and Xiaoying Su from SHUTCM for their helps during my teaching.

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第 1 章　程序设计基础

Chapter 1　Programming Basics

本章先简要回顾 VB 2008 的历史，然后介绍如何开始使用 VB 2008，最后讨论一些计算机程序设计语言的基本知识。

In this chapter, a brief the history of VB 2008 is given, then, a way how to start using VB 2008 is introduced, and some basic knowledge of a computer programming language is discussed finally.

1.1　Visual Basic 历史简介
Brief History of Visual Basic

计算机高级程序设计语言使用类似于人类的语言给出命令。BASIC 代表“初学者的通用符号指令系统”的缩写，它是一个高级语言的例子。BASIC 起源于 1964 年，由美国 Dartmouth 大学的 John George Kemeny 和 Thomas Eugene Kurtz 创造，意在为非计算机专业的学生学习程序设计服务。

High-level programming languages refer to the computer coding system that uses sentences like a human language. BASIC (an acronym for Beginner's All-purpose Symbolic Instruction Code) is one example. The original BASIC was created in 1964 by John George Kemeny and Thomas Eugene Kurtz at Dartmouth in USA, which tried to give access for non-computer students to program.

1991 年 3 月，微软公司发布了 Visual Basic 的第 1 版，当时的名字叫“雷”。它有如下特点：拖放式的控制组件、无需程序设计的图形化人机界面构建和事件驱动的程序设计模式。这就给程序员提供了一个快速、简便、图形化的窗口界面的程序设计环境。微软在 1998 年 10 月发布了 Visual Basic 的第 6 版（VB6），然后在 2008 年 3 月停止了对 VB6 的技术支持。

March 1991, Microsoft Visual Basic 1.0 started at Windows world. It had another name, i.e., Thunder at the time. Its features include a drag-and-drop control toolbox, codeless GUI (graphical user interface) creation, and an event-driven programming model. The result is the first tool that lets programmers create Windows applications quickly, easily, and visually. Visual Basic 6 started October 1998 and Microsoft stopped its support March 2008.

自 2002 年以来，VB 版本都改名为 VB .NET。2008 年微软公司发布了免费版本，VB 2008 Express Edition。在这本书里将用 VB 2008 来代表该版本。

The later versions of VB have been named as VB .NET since 2002. And in 2008, Microsoft

releases its free version of VB 2008 Express Edition; VB 2008 will be used for short in this textbook refering to this edition.

1.2 VB 2008 综合程序设计环境
VB 2008 Integrated Development Environment (IDE)

VB 2008 是一个免费的综合程序设计环境，它是商业化的 Microsoft Visual Studio 2008 软件的简化版本。发布这个版本的目的是给业余爱好者和学生提供一个简化的、容易使用和学习的综合程序设计环境。这个版本可以从网上免费下载。

Microsoft Visual Basic 2008 Express Edition is a freeware integrated development environment (IDE) developed by Microsoft that are lightweight versions of the Microsoft Visual Studio 2008 product line. The idea of creating the express edition is to provide a streamlined, easy-to-use and easy-to-learn IDE for hobbyists and students. It can be downloaded freely from the net:

http://www.microsoft.com/express/download/

最新版的 VB 2010 已经可以免费下载，其界面和用法与 VB 2008 相似。

The latest VB 2010 is freely available for downloading its usage is similar to VB 2008.

1.3 两个简单的程序设计实例
Two Simple Program Examples

使用前面介绍的 VB 2008 综合程序设计环境，编写程序一般有两种常用的方式：命令行应用和视窗应用。前者比较简单，可以用来进行快速测试程序设计；而后者涉及输入输出界面，可能会很复杂，多用于有视窗界面要求的程序设计。

Writing programs with the VB 2008 IDE introduced in the previous section, you could use two common ways: Console Application and Windows Forms Application. The former is a simple and quick way to test your design. The latter might be very complex, and it mainly involves a program with a Windows GUI.

[例 1.1] 编写一个命令行应用程序，它把一个用摄氏表示的温度值转换成华氏温度值。

[Example 1.1] Write a console application program that converts temperature from Celsius to Fahrenheit.

步骤 1：在桌面上双击 VB 2008 的程序图标（程序的图示），启用 VB 2008。

Step 1: Start VB 2008 by double clicking on this icon (a graphical representation of a program) from your desktop.

步骤 2：选择“新项目”（VB 2008 把和你的程序相关的文件都存在以“项目”名称命名的文件夹中），然后单击“命令行应用”和“OK”。见图 1.1。

Step 2: Choose New Project (VB 2008 organizes your code into a collection of documents under a name of a "project") and click on Console Application and OK. See Figure 1.1.

步骤 3：在步骤 2 中所提供的启动程序，也称为“过程”（详见第 4 章），更准确地说，在 Sub Main()和 End Sub 两行之间，是可以填写自行设计的 VB 2008 程序行的地方，见图 1.2。

Step 3: In between the starting code unit popped up after Step 2, also called a procedure (see

Chapter 4 for details), more precisely, in between the lines of Sub Main() and End Sub from Figure 1.2, you could write your own VB 2008 program.

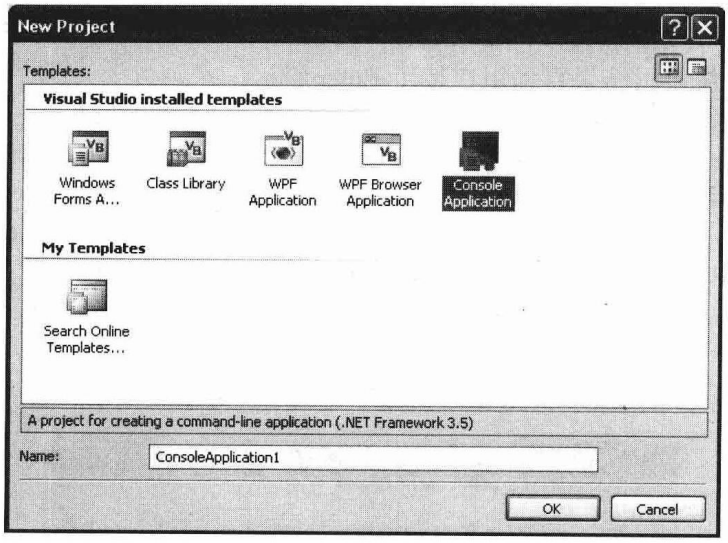

图 1.1　开启命令行应用项目

Figure 1.1　Starting a Console Application Project

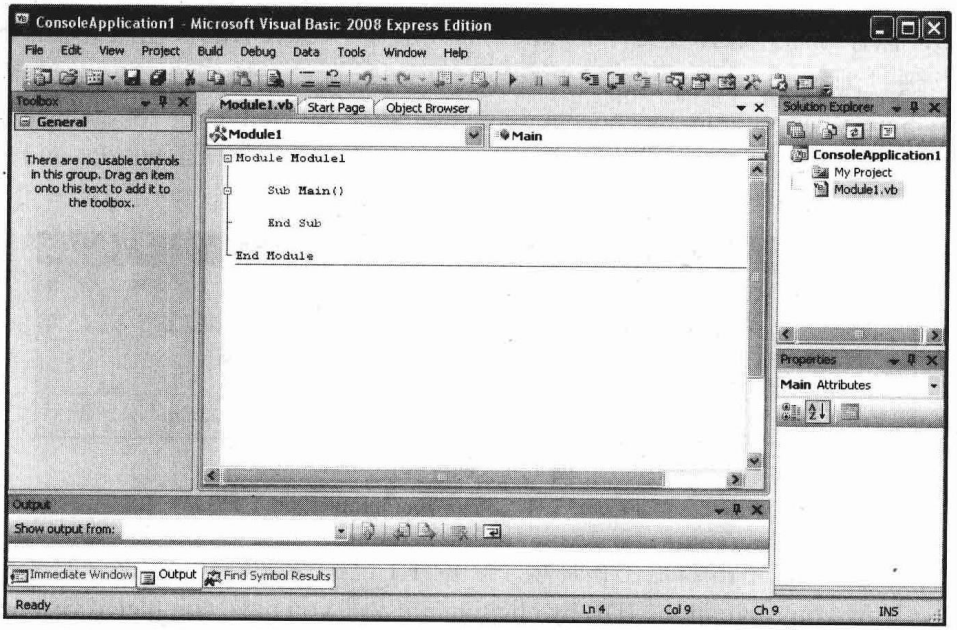

图 1.2　一个空的程序架构

Figure 1.2　An empty program skeleton

例如，可以将下述程序加到 Main() 过程中。

For example, the following code could be added into the procedure of Main().

```
Dim Tc, Tf As Double
Tc = 5.5
Tf = Tc * 9 / 5 + 32
Console.WriteLine("Tc = "·& Tc & " and its cooresponding Tf = " & Tf)
```

```
Console.ReadLine()
```

第一行定义了两个变量 Tc and Tf，它们是用来存储数值的。第二行在 Tc 变量中存了具体的数值。第三行对等号右端的表达式进行计算并将结果存入 Tf。第四行显示结果和相应的信息。第五行留住显示结果直到用户按了 Enter 键。

The first line declares two memory spaces named Tc and Tf for storing values. The second line stores a value into Tc, and the third line calculates the expression on the right-hand side of the equal sign, and assigns the result into Tf. The fourth line displays the results with a proper reminding message. And the fifth line just holds the display until a user types the Enter key.

步骤 4：在 VB 2008 综合程序设计环境中单击键运行该程序。

Step 4：Run the program by clicking the button from VB 2008 IDE.

例 1.1 的执行结果见图 1.3。

You will see the result of running Example 1.1 in Figure 1.3.

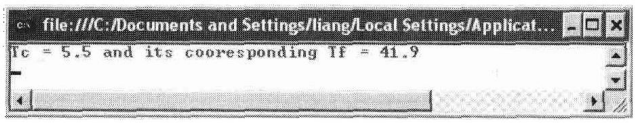

图 1.3 例 1.1 的执行结果

Figure 1.3 Result of running Example 1.1

步骤 5：保存程序。选择“文件”（File）和“全存”（Save All），在保存项目的视窗里，即图 1.4，（通过浏览（Browse）键选择文件夹和项目名称。），然后单击 Save 即可。

Step 5：Save your program by choosing: File and Save All, and in the following Save Project Window, see Figure 1.4, choose a folder (by clicking on the “Browse...” button) and a name for your project. Then, you click on Save.

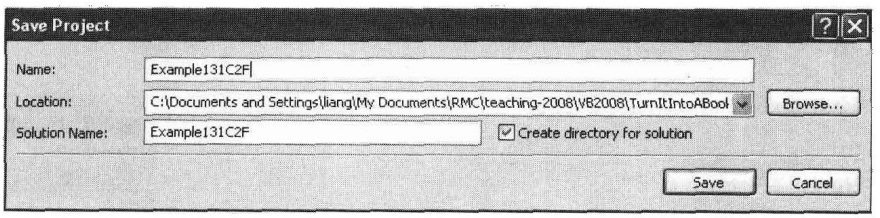

图 1.4 保存程序

Figure 1.4 Save your project

步骤 6：现在可以单击退出该环境了，例 1.1 已经完成。

Step 6：Now you can exit the IDE by clicking on: , you have completed Example 1.1.

[例 1.2] 重写例 1.1，但这一次采用视窗应用方式。

[Example 1.2] Re-write Example 1.1, but this time, use Windows Forms Application.

该例和例 1.1 十分相近，但选择 Windows Forms Application 后，会有一个视窗的窗体界面 Form1 出现。它是程序的图形化的输入输出界面。根据程序设计的要求，不同的视窗控制组件可以被放置在这个界面上。

It is very similar to Example 1.1, but when you choose Windows Forms Application, you will have a form, i.e., Form1, generated. A form is your GUI where you could put your Windows controls, i.e., the building blocks on your GUI based on the requirements of your design.

步骤 1：启用 VB 2008 后，单击 File 和 New Project 开启视窗应用（Windows Forms Application）。

Step 1: Start a Windows Forms Application by choosing File and New Project, after you start VB 2008.

步骤 2：从“工具箱”（ToolBox）中选择所需要的控件并拉到 Form1 视窗内。见图 1.5。

Step 2: You need to drag and drop those necessary controls from ToolBox window onto your Form1. See Figure 1.5.

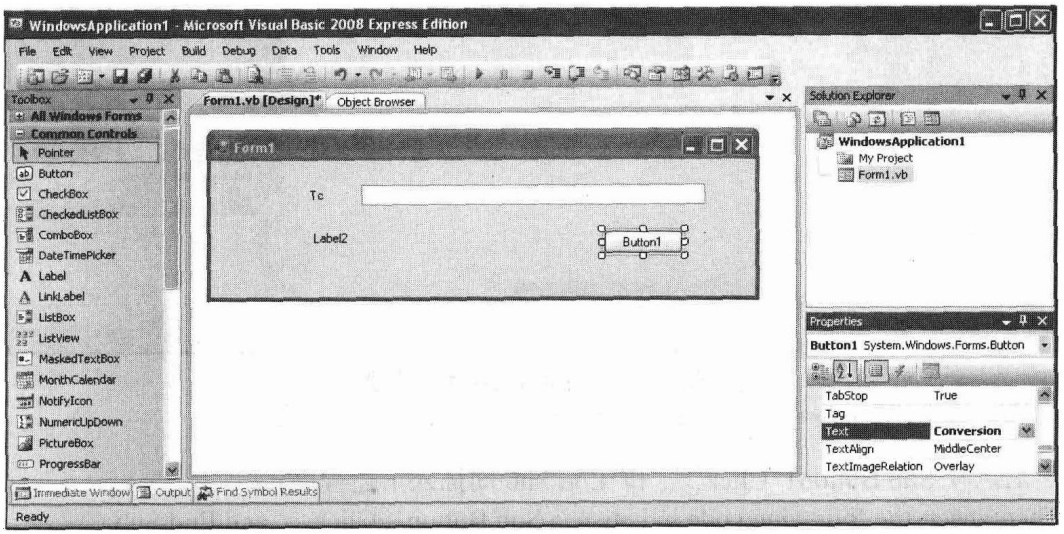

图 1.5　视窗

Figure 1.5　GUI Form1

例如，需要一个“文本框”（TextBox）来收录用户的输入信息，在这个例子中是摄氏温度。另外，还需要两个“标签”（Label）来提示输入内容或显示结果，一个放在刚刚创建的文本框的前面，用来提示输入是摄氏温度；另一个用来显示输出计算结果的华氏温度。当然，要有一个“控制键”（Button）来运行程序。控制键上的既定提示（Button1）需要改成程序设计所需要的内容，这可以在属性（Properties）视窗中改动，比如改成“换算”（Conversion）。

For example, a TextBox is needed to receive the user's input value, in this case, the temperature in Celsius. Two Labels, where you could show a message or a result value, are needed, one in front of the TextBox control to tell a user of your program what the TextBox is for, another Label for displaying the calculation result, i.e., the corresponding temperature in Fahrenheit. Of course, you will need a Button to start the calculation. By default, a text will be attached to the button, e.g., “Button1”; you have to change it to your choice in the part of IDE called Properties, where certain features of the control can be changed by changing the text(s) listed here, for example, “Conversion”.

步骤 3：如果需要在用户单击换算控键后做相应的计算，这里要写几行程序。这个通过单击来触发的计算被称作单击事件（Clicking Event）。计算后，结果要被送到标签 Label2 中显示。双击在 Form1 中标有“Conversion”的控件，然后就可以看到程序框架，见图 1.6。

Step 3: If there is necessity to do the corresponding calculation after a user click on the control button, a couple of program lines should be written. This is called a Clicking Event (an

incident when user clicks the button). After the calculation, the result should be sent to Lable2. You should double click the button marked with "Conversion" from Form1. Then, you will see your program code skeleton as shown in Figure 1.6.

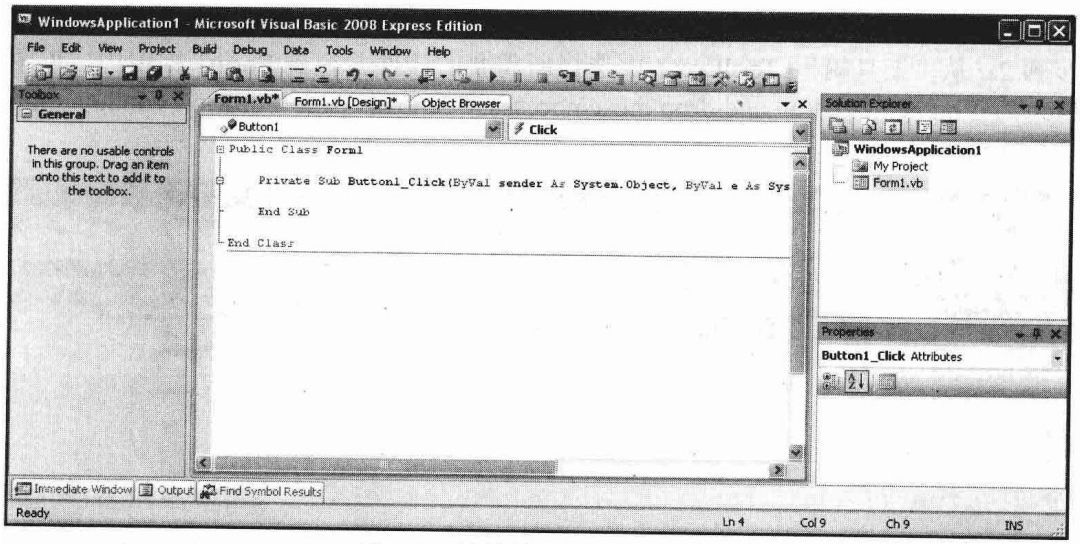

图 1.6 控件单击事件程序框架

Figure 1.6 Program Code Skeleton for Button1 Click Event

然后，在 Sub Button1_Click … 和 End Sub 间插入下述程序。

Then, insert the following code in between Sub Button1_Click … and End Sub:

```
Dim Tc As Double
Tc = TextBox1.Text
Label2.Text = Tc * 9 / 5 + 32
```

步骤 4：运行程序，会得到例 1.2 的结果。

Step 4: Run the program. You will see the result of Example 1.2.

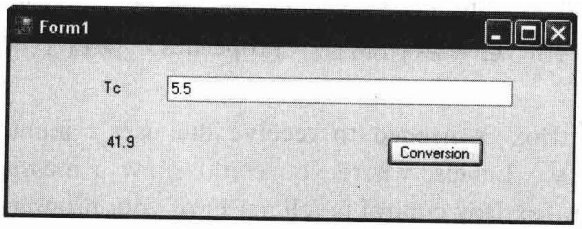

图 1.7 例 1.2 的结果

Figure 1.7 Result of Example 1.2

步骤 5：需要将程序保存起来，方法与例 1.1 类似。

Step 5: You need to save your program like we did in Example 1.1.

1.4 常量、变量以及命名方法
Constants, Variables and Their Naming Rules

进行某种计算时可能需要使用很多参数，有些参数可能会使用很多次，所以在计算之

前，必须要把它们先保存起来，以免在后续程序中重写这些数据。如果一个参数在程序运行中从不变化，这种类型的值被称为常量；相反，如果一个参数会在运算中发生变化，就被称为变量。

When you do any calculation, many values might be involved. Some of them might be used many times so they should be stored first before starting a calculation to avoid re-writing them in later calculations. If a value stored will never change, we call this type of values a constant; visa versa, if a value stored changes from time to time, then, it is called a variable.

1.4.1 命名规则 Naming Rules

常量或变量名：

The name of a constant/variable:

- 需要由一个字母开头。
  begins with a letter.
- 可以由字母、数字和下划线组成。
  may contain letters, digits and underscores.
- 不可以使用 VB 的保留字，见表 1.1。
  cannot be a VB keyword, see Table 1.1.
- 长度不能超过 255 个字符。
  cannot be longer than 255 characters.
- 应该表示其用途。
  should describe the purpose of the constant/variable.
- 不区分大小写（即 X 和 x 表示同一变量）。
  is not case-sensitive (X and x are the same variable).

1.4.2 常量 Constants

句法是使用计算机高级程序设计语言编写程序的公式。定义一个常量的句法如下。

Syntax is the formula to write a high level computer programming command. The Syntax to declare (to tell a computer to have a memory assigned for storing a value) a constant is:

```
Const aNameGivenByUser As dataType [=literal]
```

斜体部分是可以变化的。例如，aNameGivenByUser 必须是按 1.4.1 节中的命名规则起的名字，而 dataType 则是表 1.2 中的任意一种类型，[=literal]是可有可无的选项，literal 必须是一个具体的值。下面是定义一个名为 math_pi 的常量的例子。

The part in italic are things which are various。For example, aNameGivenByUser must be named by following the rules listed in Section 1.4.1; dataType is one of the primitive type given by Table 1.2; and [=literal] is optional, but literal must be a value. Here is an example of declaring a constant named as math_pi:

```
Const math_pi As Double = 3.1415967
```