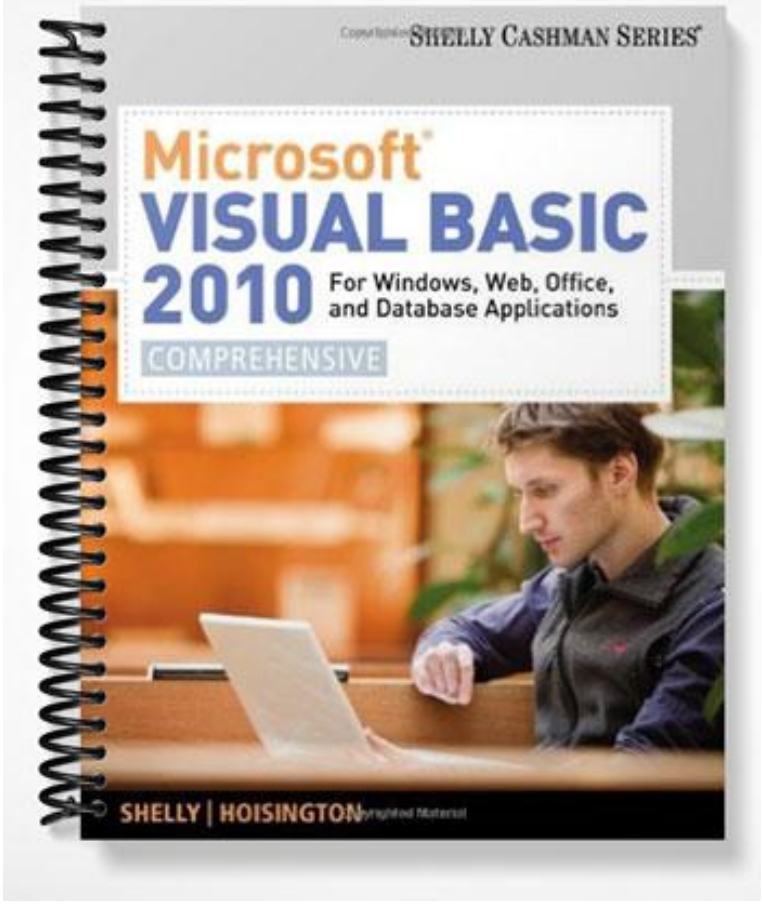
SOLUTIONS MANUAL



Visual Basic 2010

Chapter Two: Program and Graphical User Interface Design

A Guide to this Instructor's Manual:

We have designed this Instructor's Manual to supplement and enhance your teaching experience through classroom activities and a cohesive chapter summary.

This document is organized chronologically, using the same heading in red that you see in the textbook. Under each heading you will find (in order): Lecture Notes that summarize the section, Figures and Boxes found in the section, if any, Teacher Tips, Classroom Activities, and Lab Activities. Pay special attention to teaching tips, and activities geared towards quizzing your students, enhancing their critical thinking skills, and encouraging experimentation within the software.

In addition to this Instructor's Manual, our Instructor's Resources CD also contains PowerPoint Presentations, Test Banks, and other supplements to aid in your teaching experience.

For your students:

Our latest online feature, CourseCasts, is a library of weekly podcasts designed to keep your students up to date with the latest in technology news. Direct your students to http://coursecasts.course.com, where they can download the most recent CourseCast onto their mp3 player. Ken Baldauf, host of CourseCasts, is a faculty member of the Florida State University Computer Science Department where he is responsible for teaching technology classes to thousands of FSU students each year. Ken is an expert in the latest technology and sorts through and aggregates the most pertinent news and information for CourseCasts so your students can spend their time enjoying technology, rather than trying to figure it out. Open or close your lecture with a discussion based on the latest CourseCast.

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Chapter Objectives

Students will have mastered the material in Chapter Two when they can:

- Open and close Visual Studio 2010
- Create a Visual Basic 2010 Windows Application project
- Name and set the title bar text in a Windows Form object; resize a Windows Form object
- Add a Label object to a Windows Form object; name the Label object; set the text in

the Label object; change the Font properties of the text in the Label object
- Add a PictureBox object to the Windows Form object; name the PictureBox object; resize the PictureBox object
- Add a Button object to the Windows Form object; name the Button object; set the text in the Button object; change the Button object size
- Align objects on the Windows Form object
- Save and open Visual Basic projects
- Understand and implement graphical user interface design principles
- Understand and implement the first two phases of the program development life cycle

30: Introduction

LECTURE NOTES
- Review the concept of Visual Studio 2010 as an integrated development environment
- Explain the importance of achieving a solid program design plan before commencing to write code
- Describe the application to be developed using Figures 2-1a through 2-1d, pointing out that this program might be part of a larger computer application used to make hotel reservations

FIGURES: 2-1a, 2-1b, 2-1c, 2-1d

BOXES
1. Online Reinforcement: To view a video of the process in the previous steps, encourage students to visit the Web site mentioned for more information and then select Figure 2-1.

CLASSROOM ACTIVITIES
1. Class Discussion: Discuss the use of Windows standards in the user interface within Visual Studio. This constitutes a "user-friendly" aspect of Visual Studio. Ask students if seeing familiar buttons will make them feel more confident about using Visual Studio. Point out that the use of Windows standards in their own programs will improve the usability of their programs.

2. Quick Quiz:
   1) What is the relationship between Visual Studio 2010 and Visual Basic 2010? (Answer: Visual Studio 2010 is an integrated development environment that allows a programmer to write using any of the family of Visual Studio languages. Visual Basic 2010 is one of those languages.)

32: Using Visual Studio 2010

LECTURE NOTES
- Review the concept of a graphical user interface (GUI)
- Point out that the first step in designing a program is to design the user interface
- Review the concept of rapid application development (RAD), and point out that RAD tools are used in the design process
- Describe the process of starting Visual Studio 2010 for the first time
- Use Figures 2-2 and 2-3 to illustrate opening Visual Studio 2010
- Using Figure 2-3, point out the key elements of the main Visual Studio window: menu bar and Standard toolbar
- Define project and Windows Application project

- Describe the process of creating a new project in Visual Studio using Figures 2-4 through 2-8, and how to select Visual Basic Windows Application as the type of project
- Point out the key elements on the New Project window
- Describe the default Visual Basic project created by the New Project screen using Figure 2-8 and point out the key elements of the Project window: title bar with the project name, the work area, the Windows Form object, and the Toolbox button
- Describe the use of the Toolbox button to display the Toolbox
- Using Figure 2-9, point out that the Toolbox contains the graphical elements called .NET components representing the GUI objects that can be placed on the form
- Using Figure 2-10, describe the Auto Hide button with the Pushpin icon and its use, and describe Auto Hide mode
- Point out that during the GUI design process, it is usually more productive to keep the Toolbox displayed at all times
- Define Dockable mode, and describe the ability to relocate the Toolbox to another part of the IDE
- Define properties, and point out that every object has properties that control the look, feel, and behavior of objects
- Describe the Properties window and its key elements: Alphabetical button, Categorized button, and the properties list using Figure 2-11
- Describe the use of prefixes to identify the type of object
- Point out the sizing handles that appear when the form is selected
- Point out that the Properties window displays the properties for the currently selected object using Figure 2-12
- Describe the process used to change the value of an object's property using Figures 2-13 and 2-14
- Walk the students through the process of setting an object's Text property using Figures 2-15 and 2-16, and remind students that the properties of an object control the object's "look and feel"
- Describe the two methods that can be used to resize a Windows Form object, and the Size property
- Point out that the form object follows all of the familiar Windows behaviors, such as sizing handles, using Figures 2-17 and 2-18
- Describe the process of adding a Label object to the form using Figures 2-19 and 2-20. Discuss the Label .NET component. Point out that a Label object is used for user prompts and for displaying program output, and that it will not accept any user input
- Use Figures 2-21 and 2-22 to describe how to change the Name property of the Label object. Describe the purpose of the Name property, and how it will be used
- Describe the use of the Text property and how to change it using Figures 2-23 through 2-25. Remind students that this is the text that the user will see. Point out that the text can span multiple lines using Figure 2-26
- Describe the "grouped" nature of the Font choice in the Properties window and the use of the "+" symbol and the ellipsis button to display all of the Font properties, using Figures 2-27 through 2-30
- Using Figures 2-31 and 2-32, describe the use of the Format menu to center an object horizontally or vertically in a Form object
- Use Figures 2-33 and 2-34 to demonstrate how to remove a GUI component from a Windows Form object
- Point out the Undo and Redo buttons on the Standard toolbar using Figure 2-35
- Introduce the PictureBox as a container object for images

- Point out that you can load an image in a PictureBox by using properties or you can load the image at runtime by writing code to do this, and demonstrate the addition of a PictureBox object using Figures 2-36 and 2-37
- Point out that each object added to a form should be immediately named, using the standard naming conventions for each type of object
- Describe the process of resizing the PictureBox object using Figure 2-38, and mention that all GUI objects on a Windows Form object can be resized in a similar manner
- Demonstrate the addition of the second PictureBox object using Figure 2-39
- Describe the process of making two objects the same size using Figures 2-40 through 2-42, pointing out that you must select the object with the correct size first, and the object to be resized second
- Describe how to multi-select objects on the form
- Define alignment, and describe the use of the Format menu choices for alignment to align the two PictureBox objects using Figures 2-43 and 2-44
- Describe the efficiencies that can be gained by multi-selecting objects on a form and centering or aligning them all in a single operation, and remind students how to multi-select objects
- Describe the process of centering using Figures 2-45 and 2-46
- Introduce the Button object, describe how a Button object behaves in a Windows form, and describe how to add a Button object to a form using Figures 2-47 and 2-48
- Point out that the Button object's Text property controls the text that is displayed on the face of the button, and describe how to change the text on the btnStandardRoom button using Figure 2-49
- Point out the importance of verifying that a Button object is large enough to display the text correctly on its face
- Remind students that all Visual Studio GUI objects, when selected, will display sizing handles that can be used for resizing the object, and demonstrate how to resize the Button object using Figures 2-50 and 2-51
- Use Figures 2-52 and 2-53 to describe the process of adding and aligning a second Button object to the form
- Discuss snap lines, and discuss Steps 1 through 3 to make the Deluxe Room button the same size as the Standard Room button
- Introduce the concept of snap lines for both vertical and horizontal alignment of objects and their text, pointing out that the blue snap lines indicate alignment of object boundaries, while the red snap lines indicate the alignment of text within objects
- Use Figures 2-54 and 2-55 to illustrate vertical alignment, explaining what a red snap line is
- Point out the importance of regularly saving your work
- Use Figure 2-56 to illustrate how to set the location for saving the project
- Point out that when you attempt to close Visual Studio prior to saving your work, the prompt shown in Figure 2-57 will be displayed to ensure that your work is not accidentally discarded
- Describe the three methods that can be used to open an existing Visual Basic project

FIGURES: 2-2, 2-3, 2-4, 2-5, 2-6, 2-7, 2-8, 2-9, 2-10, 2-11, 2-12, 2-13, 2-14, 2-15, 2-16, 2-17, 2-18, 2-19, 2-20, 2-21, 2-22, 2-23, 2-24, 2-25, 2-26, 2-27, 2-28, 2-29, 2-30, 2-31, 2-32, 2-33, 2-34, 2-35, 2-36, 2-37, 2-38, 2-39, 2-40, 2-41, 2-42, 2-43, 2-44, 2-45, 2-46, 2-47, 2-48, 2-49, 2-50, 2-51, 2-52, 2-53, 2-54, 2-55, 2-56, 2-57

BOXES

1. Heads Up: Discuss the use of Visual Basic 2010 on Windows 7, Windows Vista, or Windows XP.

2. Heads Up: Review the steps for displaying the Solution Explorer window.

3. Heads Up: Review the steps for displaying the Properties window.

4. Heads Up: Explain how to display the properties in the Properties window in alphabetical order.

5. Heads Up: Explain to students that in addition to changing the size of an object using the sizing handles, they also can enter the Size property directly.

6. Heads Up: Discuss the use of the CTRL key to select multiple objects.

7. Heads Up: Review the appropriate object prefixes for each of the objects introduced in this chapter.

8. In the Real World: Discuss the conventions with regard to program names.

9. In the Real World: Demonstrate the Auto Hide mode of the Toolbox, pointing out the change in the icon when the Toolbox is permanently displayed (or pinned), and discuss the two different techniques that can be used for displaying the Toolbox.

10. In the Real World: Review the various options for taking .NET components and placing them in the Windows Form object.

11. In the Real World: Discuss the use of the AutoSize property to guarantee that a button is always sufficiently large for the button text.

12. Online Reinforcement: To view a video of the process in Figures 2-2 and 2-3, encourage students to visit the Web site mentioned for more information and then select Figure 2-2.

13. Online Reinforcement: To view a video of the process in Figures 2-4 through 2-8, encourage students to visit the Web site mentioned for more information and then select Figure 2-4.

14. Online Reinforcement: To view a video of the process in Figure 2-9, encourage students to visit the Web site mentioned for more information and then select Figure 2-9.

15. Online Reinforcement: To view a video of the process in Figure 2-10, encourage students to visit the Web site mentioned for more information and then select Figure 2-10.

16. Online Reinforcement: To view a video of the process in Figures 2-12 through 2-14, encourage students to visit the Web site mentioned for more information and then select Figure 2-12.

17. Online Reinforcement: To view a video of the process in Figures 2-15 and 2-16, encourage students to visit the Web site mentioned for more information and then select Figure 2-15.

18. Online Reinforcement: To view a video of the process in Figures 2-17 and 2-18, encourage students to visit the Web site mentioned for more information and then select Figure 2-17.

19. Online Reinforcement: To view a video of the process in Figures 2-19 and 2-20, encourage students to visit the Web site mentioned for more information and then select Figure 2-19.

20. Online Reinforcement: To view a video of the process in Figures 2-21 and 2-22, encourage students to visit the Web site mentioned for more information and then select Figure 2-21.

21. Online Reinforcement: To view a video of the process in Figures 2-23 through 2-25, encourage students to visit the Web site mentioned for more information and then select Figure 2-23.

22. Online Reinforcement: To view a video of the process in Figure 2-26, encourage students to visit the Web site mentioned for more information and then select Figure 2-26.

23. Online Reinforcement: To view a video of the process in Figures 2-27 through 2-30, encourage students to visit the Web site mentioned for more information and then select Figure 2-27.

24. Online Reinforcement: To view a video of the process in Figures 2-31 and 2-32, encourage students to visit the Web site mentioned for more information and then select Figure 2-31.

25. Online Reinforcement: To view a video of the process in Figures 2-33 and 2-34, encourage students to visit the Web site mentioned for more information and then select Figure 2-33.

26. Online Reinforcement: To view a video of the process in Figure 2-35, encourage students to visit the Web site mentioned for more information and then select Figure 2-35.

27. Online Reinforcement: To view a video of the process in Figures 2-36 and 2-37, encourage students to visit the Web site mentioned for more information and then select Figure 2-36.

28. Online Reinforcement: To view a video of the process in Figure 2-38, encourage students to visit the Web site mentioned for more information and then select Figure 2-38.

29. Online Reinforcement: To view a video of the process in Figure 2-39, encourage students to visit the Web site mentioned for more information and then select Figure 2-39.

30. Online Reinforcement: To view a video of the process in Figures 2-40 through 2-42, encourage students to visit the Web site mentioned for more information and then select Figure 2-40.

31. Online Reinforcement: To view a video of the process in Figures 2-43 and 2-44, encourage students to visit the Web site mentioned for more information and then select Figure 2-43.

32. Online Reinforcement: To view a video of the process in Figures 2-45 and 2-46, encourage students to visit the Web site mentioned for more information and then select Figure 2-45.

33. Online Reinforcement: To view a video of the process in Figures 2-47 and 2-48, encourage students to visit the Web site mentioned for more information and then select Figure 2-47.

34. Online Reinforcement: To view a video of the process in Figure 2-49, encourage students to visit the Web site mentioned for more information and then select Figure 2-49.

35. Online Reinforcement: To view a video of the process in Figures 2-50 and 2-51, encourage students to visit the Web site mentioned for more information and then select Figure 2-50.

36. Online Reinforcement: To view a video of the process in Figures 2-52 and 2-53, encourage students to visit the Web site mentioned for more information and then select Figure 2-52.

37. Online Reinforcement: To view a video of the process in Figures 2-54 and 2-55, encourage students to visit the Web site mentioned for more information and then select Figure 2-54.

38. Watch Out For: Point out to students how to open the Common Controls category if it is not displaying.

39. Watch Out For: Explain how to change a property that has been typed in error.

40. Watch Out For: Guide students on how to return to a form if they accidentally double-click (instead of click) an object.

41. Watch Out For: Discuss how to open the Form1 form when you open a Visual Basic project.

TEACHER TIPS

Stress the importance of entering a meaningful name for the project. Discuss the need for standards and naming conventions in program development. Point out that most companies have established standards and naming conventions that are used in all of their program development.

Point out that the default Windows Form object created with a new project exhibits standard Windows features such as the title bar, and Minimize, Maximize, and Close buttons. This is a good opportunity to introduce the concept of an object with properties.

Changing a property such as the form's background color will help students understand the nature of properties.

Point out that although each GUI object placed on a form is given a default name in Visual Studio, the developer should give each object a meaningful name.

Remind students that there are videos available which demonstrate actions. Also, at this point in the text you may wish to start addressing the issues involved in making a program "user-friendly."

Point out that built-in tools such as the resizing allows the programmer to achieve quickly the desired size in a single operation. Discuss the importance of making the GUI screen appear neat and organized by matching the sizes of objects where appropriate.

A key component of good form design is the form's visual balance. The human mind prefers visual order. Objects on the form should be similarly sized and aligned to provide a pleasing appearance. Both

vertical and horizontal alignment should be done. Objects should be arranged in a manner that is logical and makes sense for the intended use of the form.

Point out that the Button object has predefined behaviors that contribute to Visual Basic's RAD abilities. Describe the visual effects that a button exhibits when clicked, and point out that the Visual Basic programmer does not have to create these effects.

Point out that many different types of objects have the same properties, such as the Text property, and that these common properties have similar effects on each of the different object types.

Point out that every GUI object also has numeric size properties (Height and Width) that can be used for precision sizing. In addition to sizing and alignment recommendations, Button objects also should follow additional design standards including the order of buttons and the location on the form. Windows standards advise that buttons should appear horizontally across the bottom of the form or vertically along the right side of the form.

Point out that snap lines are another important RAD feature that reduces the time spent designing forms. Discuss the advantage that Visual Basic provides in being able to design rapidly the GUI interface.

CLASSROOM ACTIVITIES

1. Class Discussion: Have the students start Visual Studio 2010 by following the steps shown in the textbook as you are describing the process of doing so.

2. Class Discussion: Discuss the Windows standard of using an ellipsis button to indicate that a dialog box will open when the button is clicked.

3. Group Activity: Describe and demonstrate the Auto Hide behavior of the Toolbox.

4. Group Activity: Demonstrate how to add GUI components using the Toolbox. If possible, have students actually add a Label object as you describe it. Show them how to move it around and resize it on the form.

5. Quick Quiz:

1) Which property controls the contents of the title bar in the Windows Form object? (Answer: Text property)
2) Which three GUI objects have you learned to use? (Answer: Label, PictureBox, and Button)
3) Which property of the Button object controls the text that appears on the face of the button? (Answer: Text property)
4) Objects on a Windows form should be aligned both vertically and horizontally. T/F? (Answer: True)

LAB ACTIVITIES

1. If possible, have students actually set the Text property as you describe it.

2. Demonstrate object and text alignment to show the red and blue snap lines.

75: Program Development Life Cycle

LECTURE NOTES

- Introduce the concept of program development life cycle, briefly describe each of the seven phases, and point out that only Phases 1 and 2 will be covered at this time
- Define program code, documenting a program, and program and system maintenance
- Stress the importance of thoroughly understanding the problem to be solved before attempting to create the solution
- Point out that gathering and analyzing the requirements may be a very formal process in some organizations, and that generally two types of documents are produced: the requirements document and the Use Case Definition document
- Define requirements document, and describe its typical contents using Figure 2-58
- Define use case and Use Case Definition, and describe its contents and purpose using Figure 2-59
- Discuss the importance of listing the steps in the Use Case Definition in the correct sequence
- Point out that the GUI design should be done early in the development process, as it will serve as a foundation for the rest of the program
- Define presentation layer, mock-ups, and design principles
- Point out the advantage of using already designed screens to allow users to see how they might interact with the program
- Discuss the GUI design principles that should be followed to ensure that the user interface will assist the user

FIGURES: 2-58, 2-59

BOXES

1. In the Real World: Discuss the definitions of the term users.

TEACHER TIP

Point out that the biggest single factor in the failure of software development projects is failure to understand the problem to be solved.

CLASSROOM ACTIVITIES

1. Assign a Project: Ask the students to research the area of user interface design. The area of Human-Computer Interface is a very broad research area, so suggest that they pick a specific topic on which to focus.

2. Quick Quiz:

1) What is a use case? (Answer: A sequence of actions a user will perform when using the program)
2) What is another name for interface designs? (Answer: mock-ups)

3. Critical Thinking: Are design principles numbers 2 through 9 on pages 79–80 presented in the order of their importance? Why or why not?

80: Sample Program

LECTURE NOTES

- Point out that with the completion of the requirements document and the Use Case Definition, the first phase of program development is complete
- Discuss the analysis of each line of the requirements document as it pertains to the user interface design, and show how the mock-up screen in Figure 2-60 meets these requirements

FIGURE: 2-60

TEACHER TIP
Students may find it interesting to know that Visual Basic as a language was designed for rapid application design (RAD). Point out that its productivity tools allow developers to develop prototype applications quickly that allow users to be part of the development process.

CLASSROOM ACTIVITIES

1. Critical Thinking: Although there is a great deal of flexibility in creating the user interface design, what are the requirements that *must* be met?

2. Critical Thinking: What are the GUI design principles and Windows standards that must be followed? Which principles/standards are not as critical? As students answer these questions, encourage students to study the screens presented in the book and identify the aspects of the screens that have a design feature common to all Windows applications. In this way, they will begin to focus on the Windows standards when designing their own screens.

LAB ACTIVITIES

1. Ask students to create the GUI design from the very beginning on their own, to determine if they have mastered the use of the Visual Studio IDE and the use of the three GUI objects introduced in this chapter.

82: Guided Program Development

LECTURE NOTES

- Encourage students to work through the guided program development, and remind them that programming is best learned by actually doing it
- Discuss the Note to the Learner box, and use Figures 2-61 through 2-68 to create the mockup shown in Figure 2-60

FIGURES: 2-61, 2-62, 2-63, 2-64, 2-65, 2-66, 2-67, 2-68

1. Heads Up: Mention the use of the term ref to indicate a figure number earlier in the text that provides a fuller explanation of the task.

2. Heads Up: Emphasize the need for students to save their work periodically so that they do not lose anything they have done.

LAB ACTIVITIES

1. Encourage students to work through the guided program development. Remind them that programming is best learned by actually doing it. Using Figures 2-61 through 2-68, discuss the steps to create the mock-up shown in Figure 2-60.

End of Chapter Material

- **Learn It Online** The Learn It Online section directs students to Web-based exercises, which are fun, interactive activities that include chapter reinforcement (true/false, multiple choice, and short answer questions), practice tests, and a crossword puzzle challenge to augment concepts, key terms, techniques, and other material in the chapter.

- **Knowledge Check** The Knowledge Check section includes short exercises and review questions that reinforce concepts and provide opportunities to practice skills.

- **Debugging Exercises** In these exercises, students examine short code samples to identify errors and solve programming problems.

- **Program Analysis** The Program Analysis exercises let students apply their knowledge of Visual Basic 2010 and programming techniques. In some exercises, students write programming statements that meet a practical goal or solve a problem. In other exercises, students analyze code samples and identify the output.

- **Case Programming Assignments** Nine programming assignments for each chapter challenge students to create applications using the skills learned in the chapter. Each assignment presents a realistic business scenario and requires students to create programs of varying difficulty.

Glossary of Key Terms

.NET components (38)
alignment (62)
Auto Hide button (38)
Auto Hide mode (38)
blue snap lines (72)
Button object (65)
design principles (79)
documenting a program (75)
Font property (51)
Label .NET component (45)
Label object (45)
mock-ups (79)
PictureBox (56)
presentation layer (79)
program and system maintenance (76)
program code (75)
program development life cycle (75)
project (34)
properties (39)
Properties window (39)
rapid application development (RAD) (32)
red snap line (73)
requirements document (77)
Size property (44)
snap line (70)
Text property (42)
Toolbox (37)
Toolbox button (37)
use case (78)
Use Case Definition (78)
Visual Studio 2010 (30)
Windows Application project (34)
Windows Form object (37)
work area (37)

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