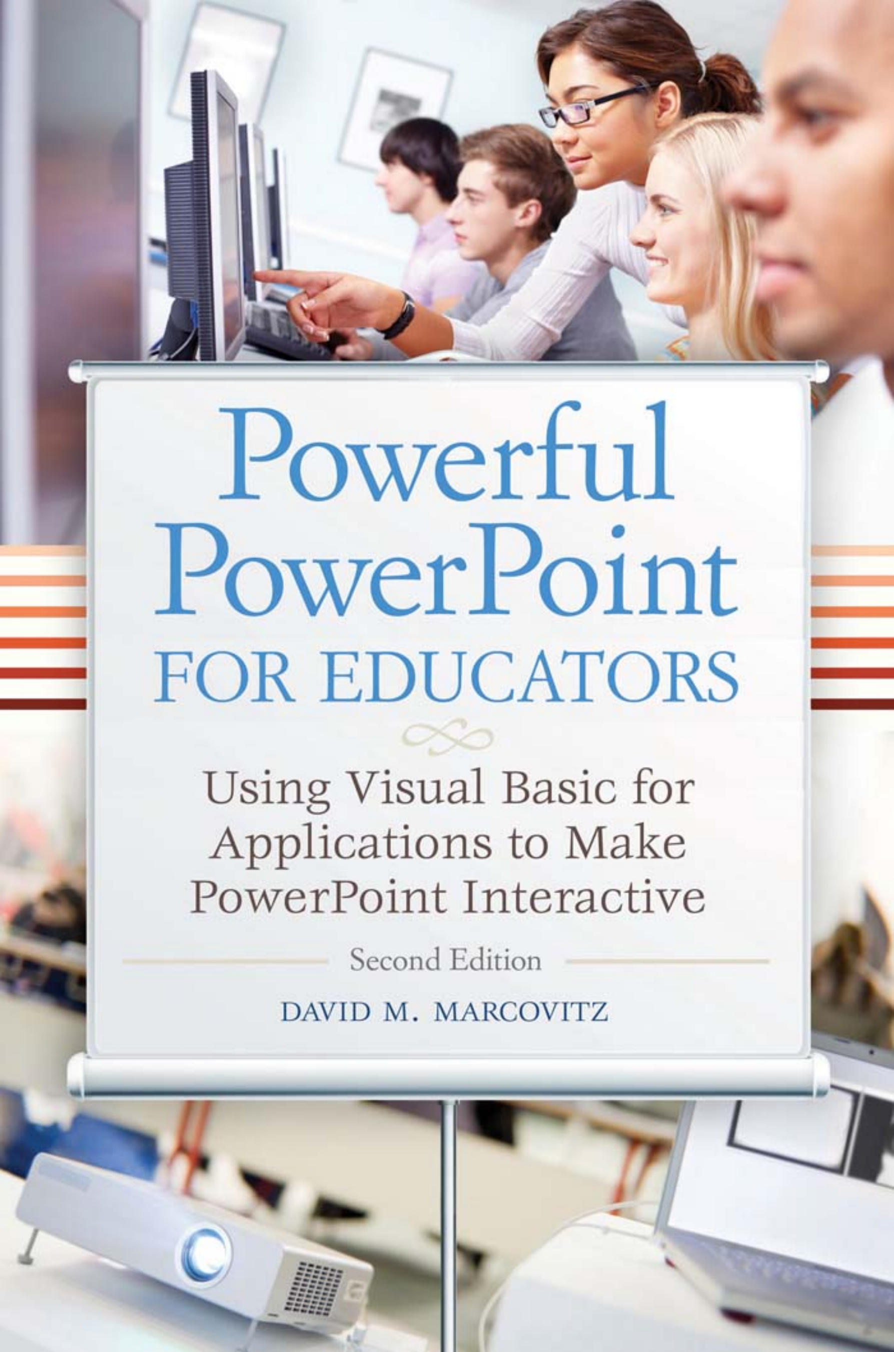

Powerful PowerPoint FOR EDUCATORS

Using Visual Basic for Applications to Make PowerPoint Interactive

Second Edition

DAVID M. MARCOVITZ

Powerful PowerPoint for Educators

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This book is printed on acid-free paper ♾

Manufactured in the United States of America

For the three ladies in my life:
Emily, Ella, and Ada

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Chapter 3: Traditional and Multimedia Features of PowerPoint (*cont.*)

Chapter 6: Let's Get Scripting (*cont.*)

Chapter 12: Templates (*cont.*)

Preface

Most educators have created simple presentations with PowerPoint™. PowerPoint is a fine tool for adding media to a lecture, but it falls flat when creating interactive lessons for students to use while sitting in front of the computer. That is, it falls flat unless you use the built-in scripting features of PowerPoint.

Starting with PowerPoint version 97, every copy of PowerPoint comes with Visual Basic® for Applications (VBA). VBA can be used to add to the functionality of Microsoft Office® applications, including Microsoft PowerPoint. With the advent of PowerPoint 97, teachers can put limited interactivity into their presentations using action settings, hyperlinks, and buttons. These features allow you to

- add buttons to control navigation (start your slide show with a menu, for example, rather than requiring linear navigation from slide to slide to slide);
- jump to other PowerPoint presentations, other files, or Web pages; and
- create rudimentary multiple-choice tests (clicking on a button with the correct answer takes the student to a slide that says "correct," for example).

While this interactivity is useful, it is also very limited. VBA extends this to nearly unlimited dimensions. With VBA, you can change the content and appearance of slides based on student input, ask for and process typed input, add additional slides, hide and show graphics, and much more.

"Wait!" I hear you cry. VBA is a sophisticated programming language. Can teachers become programmers? Certainly, many teachers can become programmers, but the goal is not to create *programmers* but rather *scripters*. A programmer learns all the subtleties of a computer language in minute detail. A scripter might learn some of the details of the language but, more important, learns a few easily modifiable scripts that can perform important tasks. Scripting is well within the reach of many teachers, and taking advantage of the power of authoring systems like PowerPoint is an important part of the International Society for Technology in Education (2001) standards for programs in technology facilitation:

- Standard III.A.7—Use methods for teaching concepts and skills that support use of web-based and non web-based authoring tools in a school environment.
- Standard III.C.1—Use methods and facilitate strategies for teaching problem solving principles and skills using technology resources.

- Standard V.C.7—Use examples of emerging programming, authoring or problem solving environments that support personal and professional development

Additionally, in the 2011 standards that were in the process of being released at the time of writing this book, several of the standards begin with the phrase, “Technology coaches coach teachers in and model design and implementation of technology-enhanced learning experiences . . .” in order to achieve a wide range of educational aims (International Society for Technology in Education, 2011). While this does not refer specifically or exclusively to creating interactive multimedia, interactive multimedia can be an important part of technology-enhanced learning experiences.

Scripting might not be a useful technique when used with a stand-alone programming language, but the real power of using VBA with PowerPoint is not merely that VBA is an accessible scripting language but that it is built into PowerPoint. One of my students created a presentation about Hawaii. It included pictures, videos, recorded voices, and links to websites. All of this used traditional PowerPoint technology (no scripting required). On top of that, she added an interactive menu and a quiz with feedback about how well the user did on the quiz. Building all of this from scratch with a programming or authoring tool could be an overwhelming task, but 95 percent of the presentation was done with traditional PowerPoint tools (things most teachers already know how to do or can learn within a couple of hours). When a few scripts are added on top of the traditional PowerPoint tools, the results are rich not only with media but also with interactivity.

Remember, the more you know, the more you can do. With a few scripts, you can add short-answer questions (with feedback about right and wrong answers) and keep score. Add a few more scripts and you can have a menu that keeps track of which sections of your presentation have been visited and only shows the button to take the quiz when all sections have been visited. Add a few more scripts and you can have the user type things that change the slides in the presentation. The possibilities are endless.

The more you know, the more you can do. And you can always add more traditional PowerPoint without knowing any more VBA.

I have been using this material (before writing a book about it) with my students, who are mostly teachers enrolled in a graduate course in multimedia design for the classroom, for about ten years. They have created powerful projects for their students (such as the Hawaii project mentioned earlier). In addition, I have been speaking about this at conferences and workshops. The overwhelming reaction I get is, “That’s great! I didn’t know you could do that.”

While this book is not accessible for computer novices, teachers who are beyond the level of computer beginner can use this technology to create powerful material for their students, material that goes beyond a simple page-turner.

For the professional multimedia designer, PowerPoint might not be the right choice. However, expensive and complicated tools are not common in schools. Using PowerPoint as a framework, teachers are able to add as much or as little interactivity as their skills allow and their needs require. Thus, PowerPoint is an appropriate multimedia tool for teachers and a powerful addition to a multimedia design class.

This book can be used as a stand-alone book in a multimedia design class for educators or as a companion for books such as Ivers and Barron (2010) or Agnew, Kellerman, and Meyer (1996), which focus on multimedia design and using multimedia projects in classrooms but do not deal with a specific technology for implementing the projects. It also stands by itself without a class. Anyone with basic PowerPoint skills can sit down with this book and begin to create powerful educational material for themselves, their colleagues, their students, or their own children.

This second edition has many updates and additions to the first edition. The biggest changes are to reflect the changes in PowerPoint since PowerPoint 2003 for Windows and PowerPoint 2001 for Macintosh. All examples should work with earlier versions but reflect new features (and bugs) of the most recent versions: PowerPoint 2007 and 2010 for Windows and PowerPoint 2011 for Macintosh.

Some of the material has been reworked based on feedback from readers and students over the years, and two new chapters have been added. Chapter 3 goes into more detail about many of the traditional interactive multimedia features of PowerPoint, and Chapter 11 adds advanced tricks reflecting the many requests I have had over the years for ways to have PowerPoint communicate beyond itself, such as writing to text files and Excel files.

Chapter 1 begins the book with some important principles of instructional design, including how to design your own projects and create assignments for your students to design their projects. If this book is used in conjunction with a book about design, the first chapter will provide an overview of what you will find in the design books, but if this book is used by itself, this chapter is very important. Jumping in and creating things is fine when you are playing around, but serious projects require some planning and design work, and Chapter 1 will give you a foundation in that.

Chapter 2 helps you configure PowerPoint by adjusting the settings needed to use the techniques in this book as well as other settings that are helpful. It also gives you an overview of the different file types that PowerPoint can create as well as the major differences among the different versions of PowerPoint.

Chapter 3 begins to explore some of the traditional interactive multimedia features of PowerPoint. Adding pictures, sounds, buttons, and hyperlinks is not difficult, but many PowerPoint users have never used those features before.

Chapter 4 introduces VBA. You'll understand how VBA fits into the world of object-oriented programming and how that affects you as a scripter. As a scripter, you won't have to understand all of VBA and object-oriented programming, but understanding objects and how to manipulate them will help you understand your scripts.

Chapter 5 begins the heart of the book as you start to learn about scripting with VBA. You'll learn how VBA is connected to PowerPoint and how to write and run your first script. You'll also learn about keeping your scripts private so your students can't look for the answers in your scripts.

Chapters 6 and 7 build your bag of scripting tricks. As a scripter, you will be interested in taking scripts directly from these chapters and applying them to your own purposes.

While each chapter contains examples that you can use right away, Chapter 8 focuses on examples that you will be able to use to create quizzes and tests.

Once you have completed Chapter 8, you will have a large bag of tricks that you can use by copying scripts directly from the book and possibly creating some on your own. Chapter 9 describes more tricks that you can use, particularly if you are ready to modify some of the ideas in the book for your own purposes. It ends with a powerful example that I used with my daughters as they were learning to read. This was around the time I was writing the first edition; now they are in high school and middle school.

Chapter 10 is a completely new chapter for the second edition with some advanced tricks. It contains ways for PowerPoint to communicate within itself and with other types of files. It focuses on using tags to store information within a PowerPoint file, writing and reading information to and from a text file, and writing information to an Excel file.

Once you have mastered a large bag of tricks, you might need some help correcting your mistakes. Whenever you write scripts, even if you just copy them from the book, you are likely to make a few mistakes. Fixing mistakes is called debugging, and you will learn some of the secrets of debugging in Chapter 11. Note that Chapter 11 is a good chapter to refer to before getting through all the previous chapters. You might want to start glancing over at Chapter 11 as you begin Chapter 7 and continue referring back to it as you finish the rest of the book.

By the time you finish Chapter 11, you will be excited to create things yourself, but you might want to share your knowledge with your colleagues and your students. Some of them will share your enthusiasm and borrow your copy of this book (or, better yet, buy their own copy) and dive right into powerful PowerPoint. Others won't be ready for the technical challenge. Chapter 12 describes how you can use templates, so your colleagues and students can take full advantage of the power of VBA scripting without knowing any of it. You can use what you learn in Chapter 12 to provide a template for your colleagues or students with the scripting already done for them (by you).

When you have completed the book, you might not be an expert at using VBA to create powerful interactive multimedia projects, but you will have a large bag of tricks that can help you do more with technology to make you a better educator.

Writing this book has been a long process. I began my journey when I attended a presentation at a conference in which the speaker was talking about all the exciting educational things that can be done with PowerPoint. I thought that he was talking about the things this book discusses, but I was wrong. I started exploring, and I found that no one was talking about these things, at least not for educators. As I looked for books to help me, I found many (look in the References section at the end of the book), but none was geared to educators or to using PowerPoint interactively. I wanted to share this with my students, so I started creating my own handouts. As the handouts grew, I began speaking about this at conferences and giving workshops. Everyone was amazed at what PowerPoint could do. By the time the handouts reached seventy pages, I knew it was time to move from handouts to a book.

I would like to thank all the people who helped me along the way, but they are too numerous to mention, so I will mention only a few. I would like to thank all my students over the years in Multimedia Design in the Classroom, particularly the first group, who had to endure the course with a few pages of handouts that were being written during the course, in most cases the night before each class. I also would like to thank Diana Sucich, one of my students who reviewed the manuscript of the first edition as it was morphing from a seventy-page packet of handouts into a book. Her comments were invaluable. I also would like to thank Luis Bango, a former student who suffered through Multimedia Design in the Classroom while the handouts were not in the best shape and reviewed the final manuscript of the first edition. I also would like to thank the PowerPoint MVPs in the Microsoft PowerPoint Forum (http://answers.microsoft.com/en-us/office/forum/powerpoint), including but not limited to Steve Rindsberg (keeper of the PowerPoint FAQ, http://www.pptfaq.com/), Shyam Pillai (http://skp.mvps.org/), and John Wilson (http://www.pptalchemy.co.uk/). The other PowerPoint MVPs have helped me in many ways, but these are three of the main experts on PowerPoint and VBA. Several PowerPoint experts give their time in that Microsoft PowerPoint Forum to answer questions from beginners and experts alike with beginning PowerPoint questions and complex scripting questions.

Finally, I would like to thank my family. My wife, Emily, has provided me with unending love and support as I have stayed late in the office to work on the book. My daughter Ella has been a guinea pig for some of my wacky projects, particularly the example at the end of Chapter 9. Both my children, Ella and Ada, have provided me with love and inspiration because I hope that my work will help my children and all children by making the computer a more effective tool for education.

You are about to embark on a great journey. At times you will be elated and at times frustrated. If you persevere, you will have the power to make the computer do what you want it to, so it can be a tool for you and your students' learning. The computer shouldn't be everything in education, but when it is used, it should be used powerfully and effectively.

1

Multimedia Design

Introduction

Welcome to the world of powerful PowerPoint™. This book will help you use PowerPoint in ways you never thought were possible, with the ultimate goal of creating better learning environments for your students. Whatever you do as an educator requires some planning, whether it takes the form of detailed lesson plans or a few notes jotted on the back of a napkin. When creating complex learning environments, planning is very important. This chapter introduces some of the basics of planning and design to help you create better learning environments. You will be introduced to the benefits of multimedia, the design process, benefits of having your students design multimedia, and metaphors and organizations for multimedia projects.

Vocabulary

- Cognitive load
- Decide
- Design
- Develop
- Evaluate
- Expertise reversal effect
- Formative evaluation
- Metaphor
- Organization
- Redundancy principle
- Sensory memory
- Storyboard
- Summative evaluation
- Working memory

What Is Multimedia?

Multimedia is a term that has been around for a long time. Before computers, it referred to a combination of slides (from a slide projector) and sounds (usually music from a tape player). It has been around for so long because people have recognized that we can be engaged through multiple senses. Some people are primarily visual learners, auditory learners, or kinesthetic learners, but most of us are a combination of all three. Using different senses increases attention, motivation, and, in many cases, learning. “The power of multimedia and hypermedia presentation software comes with changes in the ways teachers and learners have access to and demonstrate their understanding of knowledge, moving from a single dominant presentation and demonstration style (verbal/ linguistic, linear/sequential) to an integrated, multisensory learning and demonstration ‘microworld’ (Papert, 1992), where learners have more freedom of choice in the mode of learning and the order in which learning takes place” (Male, 2003, p. 6). As this quote suggests, multimedia involves multiple senses and a degree of learner control and choice.

Robinette suggests, “Multimedia is about combining sights, sounds, and interactive elements to create an experience unlike that which comes from simply reading text or idly viewing a video” (1995, p. 10). Goldberg says, “Multimedia, as I use it to define the cool new medium that I’ve been going on about, is the combination of audio/visual media elements with interactivity. . . . A typical multimedia title might include any combination of text, pictures, computer graphics, animation, audio, and video” (1996, p. 14).

Cognitive load theory (Mayer, 2006) teaches that our brains have limited working memory. Working memory is the part of the brain that processes the information we take in through our senses with the information we have stored in long-term memory (our prior knowledge). We need to be careful to use efficiently the limited working memory we have as well as to do what we can to expand it. With multimedia, careful design is necessary to do both. Distracting sounds and pictures eat up working memory as our students’ brains try to reconcile the extraneous material with what they are trying to understand. Redundant information can be distracting as well. However, well-designed media elements can add to working memory because working memory can take advantage of sensory memory to make words, pictures, and sounds more effective than any one modality alone.

Multimedia is about including a variety of media with interactivity. Typical presentations (using PowerPoint or other presentation tools) emphasize the media and not the interactivity. When enhancing a lecture to present to an audience, interactivity is not always important. However, when creating projects that your students can control, picking and choosing where to go within the project, well-designed interactivity is very important.

Interactivity relates to cognitive load theory because of the redundancy principle and the expertise reversal effect (Mayer, 2006). The redundancy principle simply states that redundant information is distracting. That is, saying the same thing over and over again in different ways can be distracting unless the different ways of saying it (possibly through different media) complement each other. The expertise reversal effect tells us that if a student knows more, then information that might not be redundant to a beginner might be redundant to an expert. Interactivity and choice in a well-designed multimedia project can alleviate these problems. If students can choose to see material in more than one way or skip certain things altogether, they can avoid being burdened with redundant information. This might include complex sections of the project that repeat what they just learned in a different way (that students who got it the first time can skip) or simple definitions or pronunciations that can be given in an optional hyperlink only for those students who need the definition or pronunciation.

Interactive multimedia helps students learn by increasing motivation, by giving them control over their learning, and by reaching them through different senses. As you design multimedia presentations for your students, you decide what media are most appropriate. Sometimes a picture is worth a thousand words; sometimes a few words are worth a thousand pictures; and sometimes, in the case of a struggling reader, for example, spoken words are more important than everything else. A few bells and whistles, used sparingly and appropriately, can increase motivation and hold your students' attention, but a carefully designed project with appropriate media elements can be a powerful experience for the learner. The key is to design your projects well.

The Design Process

While playing around on the computer is useful to help you understand the technology and brainstorm ideas for your project, the best projects come from careful planning. When you first start a project, you might think that you are saving time by jumping right in and creating the project, but you are not. Agnew, Kellerman, and Meyer (1996) outline a 12-step process for designing and developing a multimedia project:

1. Understand the scope of the project/assignment.
2. Brainstorm and do research.
3. Select pieces of information to include in the project.
4. Discuss several overall organizations.
5. Select an organization.
6. Decide on a metaphor for visualizing the body of information.
7. Decide on one or more media to represent each piece of information.
8. Prepare scripts and storyboards as required.
9. Fill in the organization with media.

10. Provide links among pieces of information.
11. Test the result with typical members of the project's intended audience.
12. Revise the project.

Ivers and Barron (2010) propose the DDD-E model: decide, design, develop, evaluate. Other instructional design models are more complex, but these two models capture the important aspects of instructional design.

Don't worry about following a specific step-by-step process. Most of the steps overlap, and some steps, such as evaluation, are continuous and take place at every stage of the process. That doesn't mean you should jump right to developing your project before deciding and designing—there is a general flow from step to step—but creating a project involves continuous evaluation and may involve rethinking and redesigning parts of the project as the project begins to take shape.

Before beginning, you must *decide* what you want to do and what you want your students to get out of the project. This includes understanding the scope of the project and brainstorming ideas for the project. Starting with a clear idea of what you want the project to cover is very useful. If you have certain objectives (from your curriculum or not), those objectives will help you determine what your project should cover. Try to limit the scope of the project, keeping in mind the limits of your students' attention span. Create a project that is small or build in features that allow students to quit in the middle and come back to explore other parts of the project.

Don't be afraid to brainstorm ideas. That means that you can come up with ideas for what you want to include that will be rejected later. This is part of the power of planning. If you create half your project first, you have either locked yourself into something that might not be what you want, or you have wasted a great deal of time creating something that you will throw away. By playing with ideas in the early stages of the design process, you can narrow down what you want to do without throwing away large amounts of work.

While you are *deciding* what the project should include, research your subject. Be sure you understand the subject so you can create something that will help others learn it. As you research, you should *decide* what information you want to include and begin to collect the media you will use to represent that information.

As you *decide*, keep in mind that your decisions are not set in stone. You should complete the *decide* phase having a good idea of what you want to do, but you should understand that the details can and will change as you move forward with your project.

Once you have an idea about what your project will entail, you should begin to *design* it. You will *design* the organization and metaphor for the project (more about this in the next sections), you will create a storyboard for the project to help you understand the flow and interaction of the project, and you will *design* the individual slides, figuring out what content and media go on each slide. Now your project is taking shape, and you should have a fairly clear picture of what the final project will look like. But again, this is not set in stone. The details can and will change, but they should change within the overall framework you have *designed*.

Next, it is time to *develop* your project. This involves filling in the pieces: creating or acquiring any media elements you need, creating your slides, placing your media elements and buttons on your slides, and linking it all together. This is much easier when you know what you want to do, having *decided* on the project and having *designed* the project first. The hardest part will be writing your scripts to make the project do what you want it to do, and you will learn how to do that beginning in Chapter 4.

The final phase is not really the final phase: *evaluate*. *Evaluation* is a continuous and ongoing process. You will conduct formative *evaluation,* in which you check your work to make sure that everything seems to be doing what you want, and you enlist others to check your work as well. This can happen at many different points in the process, and it can be done by many different people, including you, your colleagues, your students, and other members of the intended audience for the project. This formative *evaluation* will provide you with feedback to improve the project.

You also will conduct summative *evaluation* when the project is complete. As with any lesson, you want to think about specific ways you will know how well the project worked with your students. This can be used to decide whether or not you want to use the project again, and it can provide feedback for things you might want to change about the project for next time.

Project Organization

As part of the design process, you must think about how your project will be organized. Chapter 3 describes how to create hyperlinks in PowerPoint, and Chapter 7 describes how to use VBA to move from any slide to any other. However, just because you can make links from any slide to any other doesn't mean that you want to. A project with a clear organization will help your students find their way around the project.

There are several ways to organize a project. The simplest organization is linear, in which the user goes from one slide to the next to the next to the next (see Figure 1.1). This works very well for projects in which knowledge is being built from prerequisite knowledge or in which specific steps are followed in a specific order.

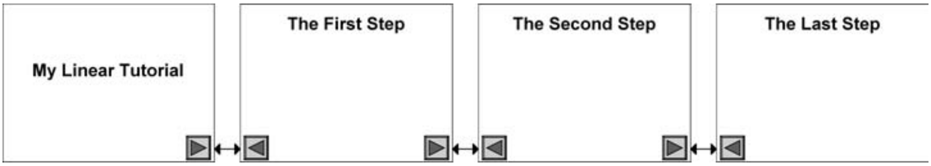


Figure 1.1. Linear Organization

However, many projects don't require a linear organization and would benefit from some other organization. Fortunately, hypermedia allows us to link any slide to any slide that we want. We could follow a menu organization (see Figure 1.2). This organization allows the user to study the topics in whatever order he or she wants and even allows the user to skip topics.

Some topics lend themselves better to a hierarchical menu structure in which each subtopic has its own menu. Other projects might do better with a completely hyperlinked organization in which any slide can lead to any other slide.

The organization you choose should match the objectives of the project. If it is not appropriate for students to skip sections, don't allow it. You provide links where you want your students to go (and in Chapter 3, you'll learn about Kiosk mode so you can make sure they only go where you want).

There are many potential structural organizations, but it is helpful to pick something that will allow the user to navigate easily through your information. If the structure is not easy to navigate, when a user goes through your presentation, it is easy to get lost in hyperspace.

Metaphors

A metaphor is the way the user will think about the project. For example, a geography project might choose a map metaphor where users click on certain locations on a map to visit the location. You might choose a book metaphor, starting with a cover and a table of contents and referring to each slide as a page (complete with page numbers and graphics that make the slides look like pages). Metaphors can be complex or simple, with more complex metaphors providing somewhat of an illusion that the user is actually in the metaphor. For example, a travel metaphor might include animations of planes taking off and landing to give the illusion that the user is actually going someplace.

Metaphors can be particularly helpful when you are not creating a project but are assigning your students to create a project. This helps students to "unleash their creativity by finding new metaphors for information. Metaphors stimulate visualizations" (Agnew, Kellerman, & Meyer, 1996, p. 121). Metaphors are a powerful tool to help users navigate a project and to help designers think creatively about a project.

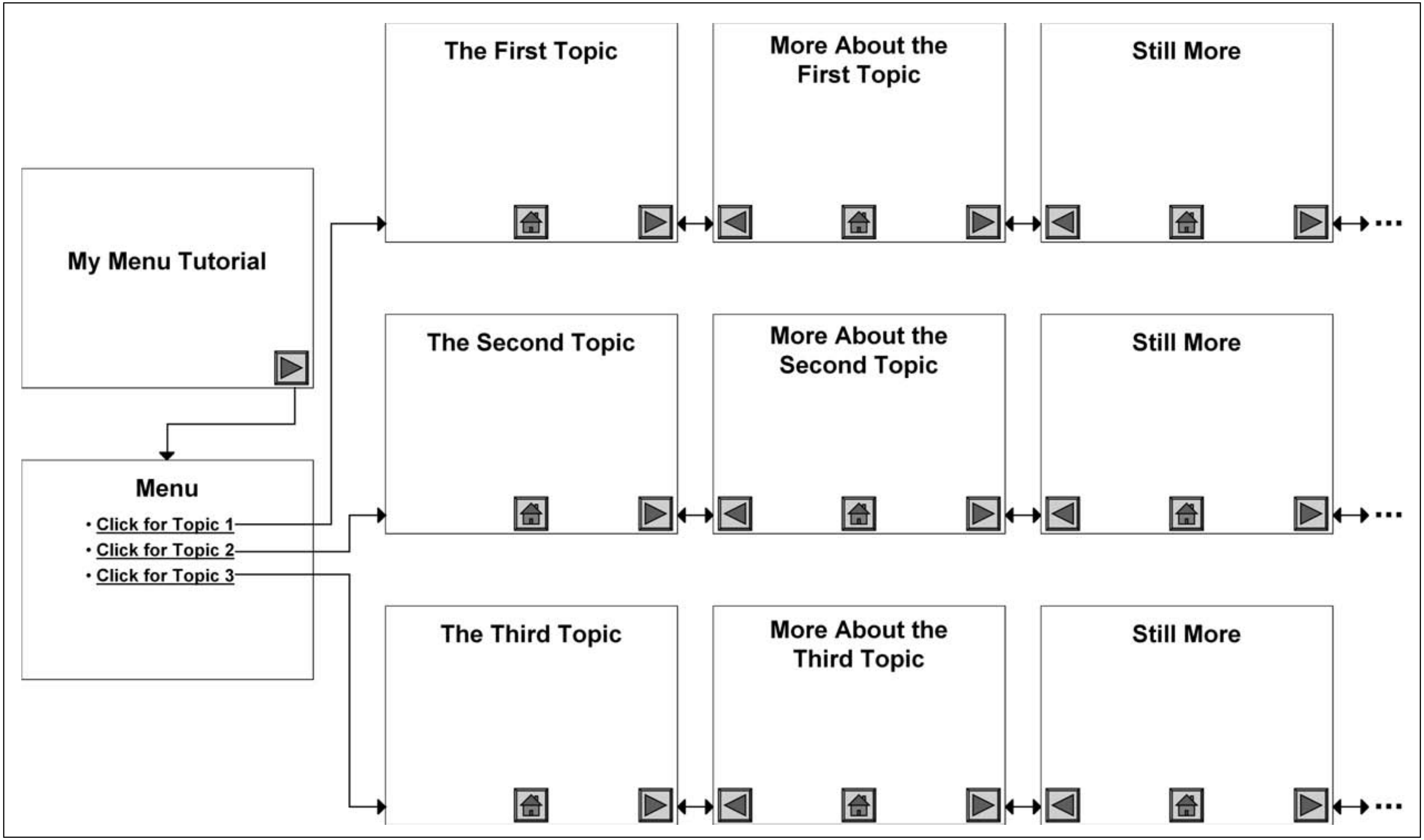


Figure 1.2. Menu Organization

Storyboards and Flowcharts

Once you have chosen an organization and a metaphor for your project, you need to figure out how the entire project will work. The more complex the project, the more this step is needed. At a minimum, you should sketch in advance your entire project, not necessarily with all the details, but with enough details so you can see how the project holds together. Indicate how each slide will be linked to any other slides and the kinds of (if not the exact) information that will be on each slide.

Although you can do this with a computer drawing program, a small screen size is limiting. You might want to map out your project on a large poster board or a giant piece of newsprint. Index cards can represent each slide in your project. You can use formal flowcharting symbols (see, for example, Ivers & Barron, 2010, pp. 69–70), or you can use a less formal system, but you must understand and map out the project.

If you are not creating the project yourself but assigning it to your students, this step becomes even more important. Your students are unlikely to do any planning unless you specifically require it and require them to hand in their designs. When they don't plan, the quality of their work will suffer, and the time it takes for them to complete their work will increase.

As you design the flow of your project, you also need to map out what will happen on each slide. You might use your giant flowchart to fill in the details, or you might use the cards on your flowchart as placeholders and have a separate drawing of each slide. As you plan the flow of your project and what information goes on each slide, you will be able to broaden and narrow your view of the project, alternately seeing an overview of the project and focusing on the details. This will help you adjust your design as you need to. It is much easier to move a card or add a card or delete a card than it is to take a half-finished project, including VBA scripts, and move everything around, rewriting the scripts to match the redesign.

This does not mean that your design is fixed once you start developing your project. But with a good idea of how the project works and most of the details in place, you will find it easier to create the project and make changes as needed.

Designing Assignments for Your Students

As powerful as it is to create multimedia projects for your students, it is more powerful to have them create their own multimedia projects. While the project you create can increase motivation and tap into different learning styles, having students create their own projects is an outstanding vehicle for creating a student-centered and constructivist learning environment, for taking a multidisciplinary approach to education, and for helping students understand information and media.

Projects you assign can be simple or complex, involving a few different types of media or several and using a simple design structure that you assign or a complex structure and metaphor that your students choose. As you continue through this book, you will learn advanced techniques for making PowerPoint do what you want it to do. You might share these techniques with your students, or you might let them create less complex projects. Another alternative is to create templates for your students in which you create the basic structure of the project, using simple or advanced PowerPoint techniques, and have your students fill in the template with content and media. Templates are discussed in Chapter 12.

Student projects need to follow a similar design process to any other multimedia projects. However, as a teacher, you must decide (1) how much you want to provide for your students and (2) how much help you want to give your students at each step.

First, you must create an assignment in a way that students can understand. Agnew, Kellerman, and Meyer (1996, pp. 120–121) outline four keys to help students create a well-organized multimedia project:

1. "articulate a well-thought-out assignment."
2. "demonstrate excellent examples of projects that others have created."
3. "encourage students to unleash their creativity by finding new metaphors for information."
4. help "students execute an effective process."

As an educator, you probably are comfortable creating assignments for your students. However, multimedia projects can be larger and more complex than ordinary assignments. Being clear about your purpose and expectations can help students understand what they are supposed to do and help them meet and exceed your expectations. Be sure to match the project you assign to your curricular goals and the technical skills of your students. If you plan to have students create several multimedia projects, you can make the first project simple to help them understand the technology. As their technology skills grow, the projects can be more complex.

Many students need concrete examples. The more multimedia you do (for yourself or your students), the more examples you will have to show students.

You also want to encourage creative thinking, including brainstorming ideas for metaphors. A metaphor helps a user navigate through a project by giving the user something from the real world to relate to what the controls (such as buttons and hypertext links) do. Metaphors can be closely related to the project or can be an unrelated navigation and visualization tools. You can provide your students with a metaphor (this might be appropriate for early projects), you can brainstorm different metaphors for different projects as a class, you can brainstorm with groups about metaphors for a specific project, or you can have groups brainstorm on their own.

Finally, you will want to help your students with the design process. Students might need help with all the design steps. You can give your students help with all of the following:

- **The Idea**—A good assignment will have a clear set of objectives, but it might allow students a great deal of latitude in picking a topic. You might need to work with students to help them generate ideas for their topic.
- **The Research**—Since one purpose of multimedia projects is to enhance learning in curricular areas, you will have to decide how much of the research you will provide for the students. You could provide all the information that will be used in the project. You could provide specific resources for students. You could help students find materials (in the library or on the Internet, for example). You could brainstorm ideas with students about where they might find the information they need.
- **Selecting Information**—Many students have trouble finding enough information, and many have trouble selecting the information to include. You might need to help students narrow down the appropriate information to include; they might not be able to include everything they find.
- **The Organization and the Metaphor**—You might pick an organization and a metaphor for your students or help them find an appropriate organization and metaphor.
- **The Media**—Students might need help selecting and preparing the media representations of their information. You might help them decide what medium to use for each kind of information, and you might help them with the technical process of creating or finding the media representations. In the extreme case, you might give them prepared media to use in their projects. You might also need to help them comply with copyright laws to ensure that they are using other people's media legally and ethically.
- **Templates**—You might provide a template for your students. This can provide a metaphor, organization, and/or types of media.

In any of the previous cases, you need to decide what is appropriate for your students. Sometimes the best policy is to leave the students alone. At other times, you will need to coach them throughout the entire project. At a minimum, your students will need to check in with you on a regular basis, showing you the design at various phases. It is often a good idea to set deadlines for various parts of the project, requiring students to turn in something to you at each of the 12 steps of the design process (see “The Design Process” earlier) or at one or more points along the way.

Multimedia projects are often an excellent vehicle for group projects. But groups can be difficult. You may decide whether you want to group students by ability levels, interests, skills, or their own choice. Once you have groups, generally of between two and five students, you need to help students work out the roles they will play in the group. Some projects have natural roles that students can play, dividing the project either by subject matter or technical specialty (gathering information, video production, VBA scripting, etc.). Learning to work with a group can be an important objective of the project, but group dynamics can be difficult, and you will have to monitor how well members of the groups are working together.

Be careful about selecting the requirements for your project. Make sure that they are suitable for your goals. Remember that part of the idea of learning multimedia is to see that great artwork or sounds do not necessarily mean great information. Make sure that, if your goal is to have worthwhile information, students are aware that that is important and any rubrics or grading criteria reflect the importance of the content and don’t overemphasize technical skills.

Finally, try to save time for reflection. A great deal of the learning (for you and your students) can come from looking back at the projects and seeing what went right and what went wrong and what was learned.

Conclusion

This chapter has given you a brief introduction to multimedia, including what it is and what its benefits are, and has introduced you to the design process. If you plan carefully, you will save yourself time and limit frustration, and you will create better projects. Finally, the chapter introduced some ideas for having your students be multimedia designers. This chapter was an introduction to, rather than complete coverage of, the design process. You might want to check out Ivers and Barron (2010) or Agnew, Kellerman, and Meyer (1996), which provide more details about the design process and using multimedia with students.

Now that you have a basic understanding of the design process, you are ready to apply it to PowerPoint. The next chapter helps you get started with PowerPoint, adjusting the settings and understanding different versions of PowerPoint and the file types PowerPoint produces. The following chapter introduces some of the interactive and multimedia features of PowerPoint and prepares you to conquer the advanced scripting features of PowerPoint in later chapters.

2

Getting Started

Introduction

This book assumes that you know the basics of PowerPoint. If you don't, you should spend a couple of hours playing with PowerPoint and/or buy an introductory book about PowerPoint. Try to get one that is specific to the version of PowerPoint that you own. While most features are identical from version to version, there are a few subtle differences in each version, and the more recent versions (2007 and higher) look very different than the older versions.

Even if you are fairly comfortable with PowerPoint, there are some things that you might not know. Some of the things in this chapter relate directly to basic features of PowerPoint (the standard stuff without VBA) while others are more applicable to using the advanced features discussed later in the book. This chapter will help you set up PowerPoint preferences in ways that will make your work easier and help you understand the various PowerPoint file types, including the ones that are specific to PowerPoint files with VBA macros.

Before using PowerPoint, there are a few things that you might want to do. I have listed some of the most important below, but you might want to check the PPT FAQ page *Do This Before Using PowerPoint Seriously* (http://www.pptfaq.com/FAQ00034.htm) for some other ideas.

Vocabulary

- Developer tab
- Embedded sounds
- File extensions
- Linked sounds
- Local printer driver
- Macro security

- Macro-enabled
- PowerPoint Presentation
- PowerPoint Show
- PowerPoint Template

PowerPoint, Windows, and Mac OS Settings

This chapter describes six settings that you might want to check before using PowerPoint. Some of the settings are specific to PowerPoint and others are for the Windows and/or Macintosh operating systems.

1. Stop Hiding File Extensions

Both Windows and Mac OS think that the pesky extensions (the 3 or 4 letters after a dot in a file name) are ugly so they are hidden by default. On the Mac, go to Finder (be sure that the Finder menu is showing next to the Apple icon in the top left corner of your screen). From the **Finder menu**, choose **Preferences**. Click on the **Advanced tab** and check the box for **Show all filename extensions**.

In Windows 7, go to the **Start button** (bottom left of the screen with the Windows icon on it) and choose **Control Panel**. Click on **Appearance and Personalization** and **Folder Options**. In the dialogue box that pops up, click on the **View tab**, uncheck the box for **Hide extensions for known file types** (you might have to scroll down in the list to see this), and click **OK**. While many times you won't care what the file extension is, you will be working with many different extensions, even within PowerPoint, so it is helpful to be able to see them.

2. Install a Local Printer Driver (Windows Only)

PowerPoint needs a printer driver installed. If it doesn't have one, it gets upset. It doesn't care that you have gone paperless and don't even own a printer. It needs a printer driver. If it doesn't have one, it will display symptoms that you will never associate with a missing printer driver (fonts not looking right on the screen, shapes moved around, etc.). That is why it is best to take care of this right from the start. The details of how to do this will vary based on which version of Windows you use, so your best bet is to search for how to do this at http://windows.microsoft.com/ if you don't know.

3. Sounds Settings for PowerPoint 2007/2008 and Earlier

If you are using PowerPoint 2007/2008 or earlier, you might want to adjust your sound settings. Starting in 2010/2011, media files are generally embedded in the file. In earlier versions, videos and some sounds are linked. In 2007/2008 and earlier, only WAV sounds (*.wav) can be embedded and only if they are small enough. What "small enough" means is determined by a setting. In 2007 (for Windows), choose **PowerPoint Options** from the **Office button**, click on the **Advanced tab** and scroll down to the **Save section**. In 2003 and earlier (Windows), choose **Options** from the **Tools menu** and click on the **General tab**. In 2008 and earlier (Mac), choose **Preferences** from the PowerPoint menu and click on the **General tab**. Look for the setting for **Link sounds with file size greater than**. Whatever size you set is the definition of "small enough." I recommend setting this to 50000, which is the largest setting possible. This will mean that, if it is a WAV sound, it will almost certainly become part of the PowerPoint file.

4. Show the Developer Tab in the Ribbon

Most people don't use macros in PowerPoint so the Developer tab is automatically hidden. After Chapter 3, you will need it, so you might as well make it available now. In PowerPoint 2010, go to the **File menu**, choose **Options**, and choose **Customize Ribbon**. On the right side of the dialogue box under **Main Tabs**, check the box for **Developer** (probably the only unchecked box). In PowerPoint 2007, click on the **Office button** and click the button for **PowerPoint Options**. Under **Popular**, check the box for **Show Developer tab in the Ribbon**. In PowerPoint 2011, go to the **PowerPoint menu** and choose **Options**. Click the **Ribbon button** at the top and check the box for **Developer** from the list of tabs to show or hide at the bottom.

5. Set Macro Security

VBA is a powerful programming environment. It can do almost anything that can be done to your computer, including creating, deleting, or modifying files. It can access other programs, such as Outlook (an e-mail program). These features have been used to create and spread computer viruses and worms that destroy files and spread them to other computers. You could, for example, write a VBA program that deletes some important system files (making it impossible for the computer to start) and mails itself to others through e-mail. This has been done, and it affects you in two ways. First, once you learn enough VBA (and it doesn't take that much), you could do this. Don't!!! Don't even play around with this. It is inappropriate, unethical, and in many cases illegal. Second, and more relevant to you (since I'm sure you wouldn't entertain the thought of writing viruses), some virus protection systems might look askance at your legitimate work.

The thing you are most likely to see is PowerPoint's macro protection. This can be found in different places in different versions of PowerPoint. In PowerPoint 2007 and 2010, click on the **Developer tab** in the Ribbon (see #4 if you don’t have the Developer tab showing) and click on **Macro Security**. I recommend the setting for **Disable all macros with notification**. With this setting, when you open a presentation that contains macros, you will have the option of enabling them or not.

In PowerPoint 2011, go to the **PowerPoint menu** and choose **Options**. Under the **General tab**, click on **Enable macro virus protection**; this will also force PowerPoint to ask if you try running a presentation with macros.

Finally, in PowerPoint 2003 or earlier, go to the **Tools menu** and choose **Options . . .** Under the **Security tab**, click the button for **Macro Security . . .** and choose **Medium** to have it ask you if you want to run macros in any PowerPoint file that contains them.

6. Create a Folder and Save

Before you start working on a PowerPoint project, create a folder on your disk for your project and save your presentation to that folder. Saving should be the first thing that you do (before even entering your title or your first line of VBA code). This will be important when you start including hyperlinks and multimedia objects in your presentation. Most elements of your presentation will be embedded in your presentation. That is, they will be part of the PowerPoint file. Other elements will be stored in other files, and your presentation will link to those other files. If you save your presentation first and you save any linked files to the same place you save your presentation (that is, the same folder on the same disk), your links will continue to work when you move the presentation (along with all the linked files) to another place, such as another folder, another disk, or another computer. If you don’t save your files first, the links are likely to stop working.

For PowerPoint 2010/2011, this is less important because your media files (pictures, sounds, and videos) are generally embedded in the PowerPoint file, but links to other kinds of files (Word documents, other PowerPoint files, etc.) will still be separate files. In versions prior to 2010/2011, all video files and many sounds cannot be embedded in the PowerPoint file and will always be linked as external files. This makes it very important, in those versions, to put these files into the same folder as the PowerPoint file before inserting them.

PowerPoint File Types

PowerPoint works with many different types of files. Most people have dealt with PowerPoint Presentation (*.pptx) files because that is the default format that PowerPoint reads and writes to. For the purposes of this book, you also need to understand PowerPoint Macro-Enabled Presentations (*.pptm). You might also want to use PowerPoint Shows and PowerPoint Templates as well as files from older versions of PowerPoint. Table 2.1 lists the various types of files with which you might be concerned.

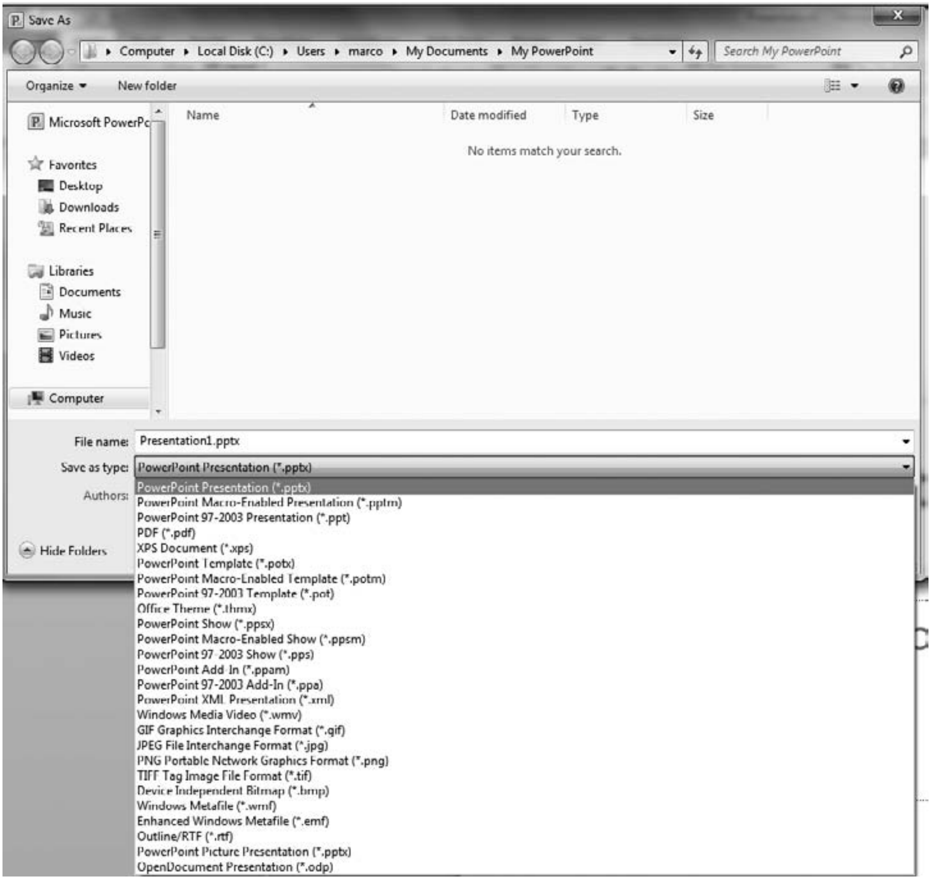
Table 2.1. PowerPoint File Types

	No macros	**Macros**	**2003/2004 and earlier**
Presentation	PowerPoint Presentation (*.pptx)	PowerPoint Macro-Enabled Presentation (*.pptm)	PowerPoint Presentation (*.ppt)
Show	PowerPoint Show (*.ppsx)	PowerPoint Macro-Enabled Show (*.ppsm)	PowerPoint Show (*.pps)
Template	PowerPoint Template (*.potx)	PowerPoint Macro-Enabled Template (*.potm)	PowerPoint Template (*.pot)

First you need to know whether you plan to run macros. If not, a regular PowerPoint file will be fine. If you do plan to run macros (and use anything in this book after Chapter 3), you will need a “macro-enabled” file type. Older versions of PowerPoint (2003/2004 and earlier) did not have a different file type for presentations that run macros. In PowerPoint 2007 or later, if you create files with macros and save them, the macros will not be saved. They might continue to work until you close the file, but once you close the file and open it again, the macros will be gone.

Next, decide if you want a presentation, a show, or a template. A presentation is a standard PowerPoint file. A show starts in Slide Show View when you open it from Windows Explorer or Finder (generally by double-clicking on the file), and a template is used to create a new presentation based on the template. While most people just use presentations, shows are powerful for the interactive presentations in this book because they can be loaded on computers and when your students run them, they generally will open right to the slide show and not give options for editing.

When you first save a file (which you should do right when you start working), PowerPoint will default to saving the file as a PowerPoint Presentation (*.pptx). If you want a different file type, you will have to choose it from the list of file types. For most of what you do in this book, you will want a PowerPoint Macro-Enabled Presentation (*.pptm) or PowerPoint Macro-Enabled Show (*.ppsm). When you save, depending on the version you use, you might have to scroll down in the list of file types to find the right file type. In PowerPoint 2010, click on the drop-down menu next to **Save as type:** (see Figure 2.1).


Save As
Computer ▸ Local Disk (C:) ▸ Users ▸ marco ▸ My Documents ▸ My PowerPoint
Search My PowerPoint
Organize
New folder
Microsoft PowerPc
Favorites
Desktop
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Computer
Name
Date modified
Type
Size
No items match your search.
Authors:
Hide Folders
PowerPoint Presentation (*.pptx)
PowerPoint Macro-Enabled Presentation (*.pptm)
PowerPoint 97-2003 Presentation (*.ppt)
PDF (*.pdf)
XPS Document (*.xps)
PowerPoint Template (*.potx)
PowerPoint Macro-Enabled Template (*.potm)
PowerPoint 97-2003 Template (*.pot)
Office Theme (*.thmx)
PowerPoint Show (*.ppsx)
PowerPoint Macro-Enabled Show (*.ppsm)
PowerPoint 97-2003 Show (*.pps)
PowerPoint Add-In (*.ppam)
PowerPoint 97-2003 Add-In (*.ppa)
PowerPoint XML Presentation (*.xml)
Windows Media Video (*.wmv)
GIF Graphics Interchange Format (*.gif)
JPEG File Interchange Format (*.jpg)
PNG Portable Network Graphics Format (*.png)
TIFF Tag Image File Format (*.tif)
Device Independent Bitmap (*.bmp)
Windows Metafile (*.wmf)
Enhanced Windows Metafile (*.emf)
Outline/RTF (*.rtf)
PowerPoint Picture Presentation (*.pptx)
OpenDocument Presentation (*.odp)

File name: Presentation1.pptx

Save as type: PowerPoint Presentation (*.pptx)

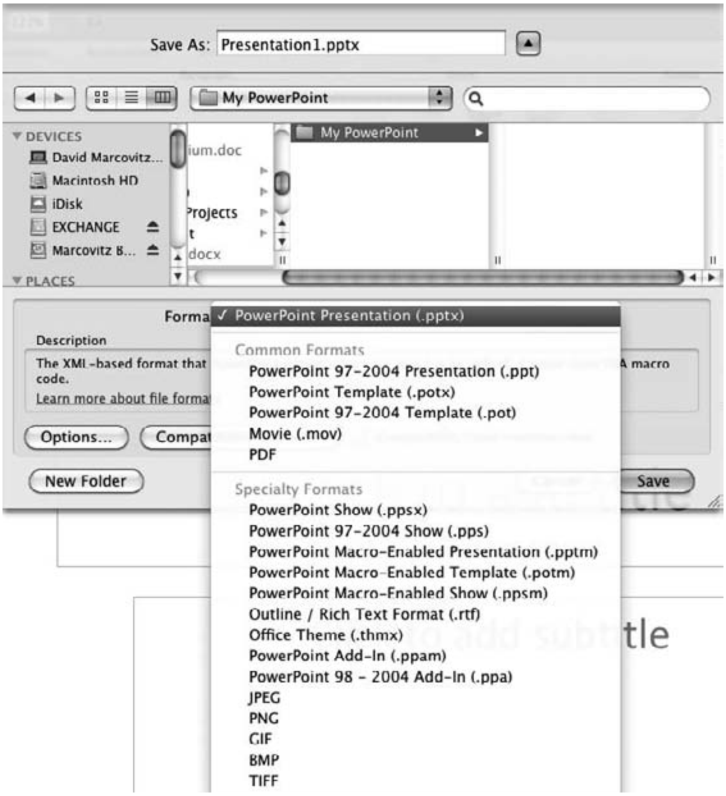
Figure 2.1. Save with a different file type in PowerPoint 2010

In PowerPoint 2011, click on the drop-down next to **Format** and look under **Specialty Formats** (see Figure 2.2).

If you save a file to be compatible with an earlier version of PowerPoint (*.ppt, *.pps, or *.pot), such as PowerPoint 97–2003 Presentation, you are likely to lose some of the newer features. Most of what is described in this book should be compatible with older versions, but most things that weren't part of the earlier versions won't work in the earlier versions.

PowerPoint Versions

VBA was introduced into PowerPoint in the 97 version (98 for Macs). Although most things have worked the same ever since, each version has had its differences, its own bugs, and its own quirks. The biggest difference is that 2008 for the Mac did not include VBA at all, but it was back (and better than



Save As: Presentation1.pptx

Format: ✓ PowerPoint Presentation (.pptx)

Description

The XML-based format that … A macro code.

Learn more about file forma

My PowerPoint
DEVICES
David Marcovitz...
Macintosh HD
iDisk
EXCHANGE
Marcovitz B...
PLACES
ium.doc
Projects
t
docx
My PowerPoint
Common Formats
PowerPoint 97-2004 Presentation (.ppt)
PowerPoint Template (.potx)
PowerPoint 97-2004 Template (.pot)
Movie (.mov)
PDF
Specialty Formats
PowerPoint Show (.ppsx)
PowerPoint 97-2004 Show (.pps)
PowerPoint Macro-Enabled Presentation (.pptm)
PowerPoint Macro-Enabled Template (.potm)
PowerPoint Macro-Enabled Show (.ppsm)
Outline / Rich Text Format (.rtf)
Office Theme (.thmx)
PowerPoint Add-In (.ppam)
PowerPoint 98 - 2004 Add-In (.ppa)
JPEG
PNG
GIF
BMP
TIFF
Options...
Compat
New Folder
Save
tle

Figure 2.2. Save with a different file type in PowerPoint 2011

ever) for 2011. The VBA interface has remained virtually unchanged across all versions, but the PowerPoint interface changed drastically with the introduction of the Ribbon in version 2007. For the Mac, version 2011 got the Ribbon, but it retained the standard menus as well so most features can be accessed either way. Two powerful features were introduced in PowerPoint 2002: multiple masters and trigger animations. Multiple masters allow for different slides to have different masters (the background colors, images, and shapes on a slide as well as the default placement and formatting of items on a slide). Trigger animations are an extremely useful interactive feature. Some things you might choose to do in VBA can be done with triggers. Triggers allow an animation to take place by clicking an object on a slide. For example, you might have a shape appear when another shape on the slide is clicked. Without triggers, the only way to do this is with VBA. However, triggers can’t impact shapes on other slides or be activated on mouse over (just on a mouse click); VBA is still necessary for those things. Worst of all, trigger animations are not available for any Macintosh version (at least through 2011).

As for VBA-related differences, starting in 2002, both multiple masters and animations have a significant impact on using VBA to impact master slides and animations. This book does not cover using VBA to make changes to animations and only touches briefly on affecting master slides, but code that works in 2002 and later for those things will not work in earlier versions.

Another significant feature that is missing from all Macintosh versions is the control toolbox. The control toolbox allows the creation of forms with text areas and buttons that can be manipulated directly on a slide and then processed using VBA. Many things in the control toolbox can be replicated with standard shapes, but some things are more difficult (such as a drop-down menu) or impossible (such as allowing text to be typed directly onto the slide) without it.

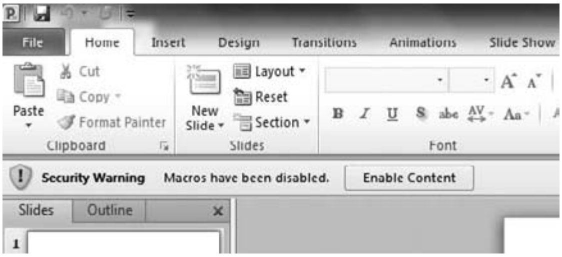
Finally, some of the VBA features have had various bugs and inconsistencies. Some of these bugs have been fixed with updates, so it is important to make sure you install all the updates for whichever version of PowerPoint you are running. The most significant problems have to do with hiding and showing shapes using the `.Visible` property of a shape (see Chapter 7). Fortunately, all the bugs seem to be worked out of this for 2010 and 2011, but if you are using an earlier version, watch out for these things. In 2002 and 2003, animations on a slide sometimes interfere with VBA hiding and showing objects so the objects wouldn't appear or disappear until the slide show was exited. In 2004 (and earlier on the Mac), when shapes were hidden or shown using the `.Visible` property, the shapes wouldn't disappear or appear until the slide was refreshed (generally by going to another slide and coming back).

PowerPoint 2007 broke the `.Visible` property altogether (this wasn't true for everyone using 2007, but it was true in some installations of 2007). In most cases, when a shape was hidden or shown with `.Visible`, it wouldn't change until the slide show was exited. Refreshing the slide didn't help. For 2007, the only way to consistently hide and show shapes was a workaround, such as moving the shape off the viewable area of the slide (to hide it) and back onto the viewable area of the slide (to show it). Workarounds for these bugs are described in Chapter 7 (p. 104).

As the latest versions seem to be less buggy than previous versions, we can only hope that bugs will be more limited in the future. However, as new bugs are found or created, you can check the book's website (http://www.PowerfulPowerPoint.com/) for the latest bug reports.

Opening a File with Macros

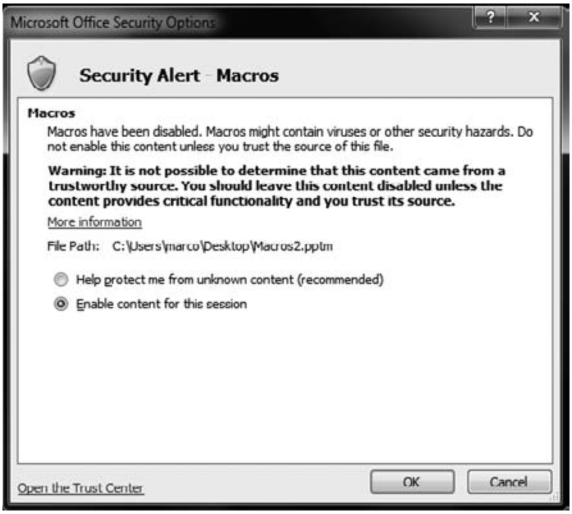
When you first open a file with macros, if you set your macro security settings to **Disable all macros with notification**, you will have the option of enabling macros. You will only get this option when you first open the file so you'll want to make the right choice from the beginning. If you use an older version (and have Macro Security set to **Medium**) or a Mac version (and have enabled **Macro Virus Protection**), you will see a dialogue box when the file opens asking you if you want to enable macros. In 2007 or later, the message can be more subtle. When the subtle message comes up, be sure to click **Enable Content**. See Figure 2.3.



Security Warning Macros have been disabled. Enable Content

Figure 2.3. Enable Macros in PowerPoint Presentation

If you run the slide show, either by opening a PowerPoint Macro-Enabled Show (*.ppsm) or by opening a PowerPoint Macro-Enabled Presentation (*.pptm) or an older PowerPoint file that contains macros (*.pps or *.ppt) and jumping immediately into Slide Show View, you will first be presented with a dialogue box asking you if you want to enable the content. Be sure to select **Enable content for this session**. See Figure 2.4.



Microsoft Office Security Options

Security Alert - Macros

Macros

Macros have been disabled. Macros might contain viruses or other security hazards. Do not enable this content unless you trust the source of this file.

Warning: It is not possible to determine that this content came from a trustworthy source. You should leave this content disabled unless the content provides critical functionality and you trust its source.

More information

File Path: C:\Users\marco\Desktop\Macros2.pptm

○ Help protect me from unknown content (recommended)

● Enable content for this session

Figure 2.4. Enable Macros in PowerPoint Show

As mentioned earlier (see Set Macro Security, p. 15), macros can be dangerous. If you are not expecting a file to contain a macro, you shouldn't enable macros for that file. If the file is not supposed to have macros, you can open it without enabling macros and save it with a non-macro-enabled file type (such as *.pptx). When the file is closed and opened again, the macros will be gone. However, you are going to be creating many macros that are not dangerous so you will want to use the earlier instructions to enable macros when you open your files or any files from sources you trust that are supposed to have macros.

Conclusion

By following the instructions in this chapter, you will be all ready to use PowerPoint in new and exciting ways. Most of the settings only have to be set once so you should set up them up right away. Then, you will only have to refer back to this chapter when you work on a new computer and have to get the settings where you want them.

3

Traditional and Multimedia Features of PowerPoint

Introduction

Some people, even longtime PowerPoint users, are not aware of many of the multimedia and interactive features of PowerPoint. Most of this book describes how you can use scripting features of PowerPoint to make presentations interactive. This chapter briefly describes some of the multimedia and interactive features that do not require scripting. You will learn about media elements, such as pictures and sounds, and you will learn about interactive elements such as hyperlinks and action buttons. In addition, you will learn about the important differences in Slide Show View and Normal View when editing your slides. Finally, you will learn about Kiosk mode and saving your project as a PowerPoint Show to control how your students navigate through your presentation.

Most of the media elements, as well as many interactive features, can be found on the Insert tab of the Ribbon (see Figure 3.1) for PowerPoint 2010 (Windows) and in the Insert menu and the Home tab of the Ribbon for PowerPoint 2011 (Mac).

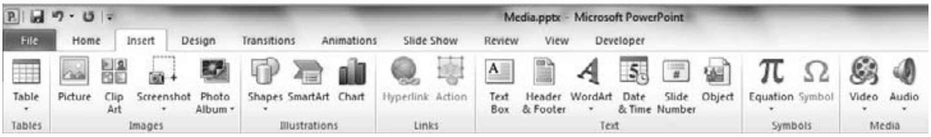


Figure 3.1. Insert tab of the Ribbon for PowerPoint 2011

You can see the Ribbon is divided into sections: Tables, Images, Illustrations, Links, Text, Symbols, and Media. This chapter will not cover all of these. It will introduce images, shapes, links, and media.

Vocabulary

- Action buttons
- Clip art
- Copyright
- Embedded
- Fair use
- Hyperlinks
- Hypertext
- Kiosk mode
- Linked
- Normal View
- PowerPoint Show
- Slide Show View

Inserting Images

You can insert pictures into a PowerPoint presentation in several different ways, including by inserting from the clip art library, by inserting from an existing file, and by copying and pasting from another place, including the World Wide Web. In addition, if you are artistically inclined, you can use the drawing tools to draw your own pictures. Generally pictures are embedded in your PowerPoint presentation. That is, once you insert them, they become part of the presentation, regardless of what happens to the original picture file.

PowerPoint allows you to insert several different kinds of images. If you have pictures in a file in any one of several file types, you can click on the **Picture button** of the **Insert tab** of the **Ribbon** in PowerPoint 2007 or 2010 or the **Picture button** of the **Home tab** of the **Ribbon** in PowerPoint 2011. PowerPoint recognizes many different types of picture files, including most of the common ones you are likely to encounter, such as Graphic Interchange Format (*.gif), Joint Photographic Experts Group (*.jpg), Portable Network Graphics (*.png), Tag Image File Format (*.tif or *.tiff), and Bitmap (*.bmp). Photographs are generally in the JPEG (*.jpg) or PNG (*.png) formats while clip art is generally in the GIF (*.gif) format.

If you try to insert a picture into your presentation and PowerPoint gives you an error or asks you how to convert it, you will need to find a program (such as GraphicConverter™ or Adobe Photoshop™) or a website (such as http://www.zamzar.com) that can read that file type and create files of one of the types that PowerPoint can read.

When inserting a picture, the dialogue box you see will vary slightly depending upon which version of PowerPoint you are using, but it should look similar to the dialogue box you see whenever you try to open a file on your computer. From this point, locate the file with the picture you want to insert and click on the **Insert button**. Note that the Insert button has an arrow next to it. The arrow allows you to choose whether you want to insert the picture, link to the picture, or both insert and link (see Figure 3.2).

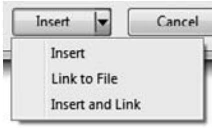


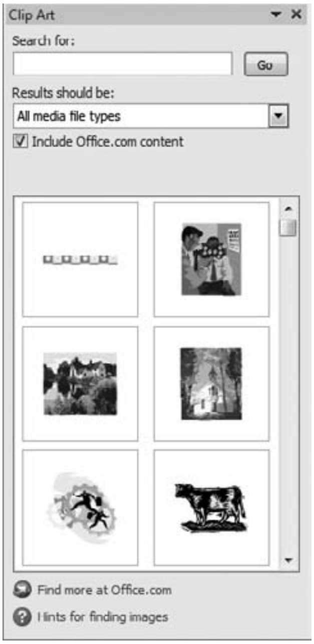
Figure 3.2. Insert, Link, or Insert and Link Pictures

By default (if you don't choose any of the options), the picture will be embedded in the file. By linking to the file, the picture is an external file and will not show up in your presentation if PowerPoint can't find the file. The advantage of linking is that it is easy to change pictures without having to change the PowerPoint file. All you have to do is replace the picture on your computer with another picture of the same name. Imagine, for example, that the picture is of the student of the week or a graph of the current grade distribution. If nothing else in the PowerPoint changes, just replace the old picture files with the new ones (e.g., StudentOfTheWeek.jpg) and the presentation is changed. Just be sure that the picture is in the same folder as the PowerPoint file before you link it the first time. By choosing **Insert and Link**, PowerPoint looks for the external file to show the picture, but if it can't find it, it uses the version that it embeds in the PowerPoint file. Additionally, if the external file is newer than the embedded version, it automatically replaces the embedded picture with the new version. In PowerPoint 2011 (Mac), you have the same options, but instead of a menu on the **Insert button**, you have a check box for **Link to File** and **Save with Document**. If **Link to File** is checked, the picture is an external file. Also, checking **Save with Document** is the equivalent of **Insert and Link** in PowerPoint 2010.

In PowerPoint 2011 (Mac), in addition to inserting a picture from a file, you can use the Photo Browser to browse files on your computer or from within your iPhoto library. The Browser also has tabs to browse for other types of media files.

If you insert clip art (from the **Clip Art button** on the **Insert tab** of the **Ribbon** in 2007 and 2010 or the **Clip Art Gallery . . .** choice on the **Picture button** on the **Home tab** of the **Ribbon** in 2011), you can search the library of clip art by keyword for clip art on your computer and online. Figure 3.3 shows the Clip Art task pane that pops up in PowerPoint 2007 and 2010 to allow you to search.

Another way to add graphics to your presentation is to copy and paste. Generally, if you can see it on your computer, you can copy it into your presentation. However, you must be careful; although you might be able to copy a picture into your presentation, you might not have the right to copy it into your presentation. Be sure to follow copyright law and guidelines, noting that just because you don't see a copyright symbol © does not mean that the picture or Web page is not copyrighted. While the fair use aspects of copyright law give you a great deal of freedom to use copyrighted material for educational purposes,



Results should be: All media file types

☑ Include Office.com content

Figure 3.3. Clip Art Task Pane

many restrictions apply as to what you can use, how much you can use, and for how long you can use it. Your best bet is to use material you have created yourself, material that is in the public domain, material for which you have obtained permission to use, or material that is licensed under Creative Commons. But if you must use copyrighted material without permission, you should pay close attention to the Fair Use Guidelines for Educational Multimedia (see http://copyright.lib.utexas.edu/ccmcguid.html). While these guidelines are not the law, they are a good guide for your fair-use rights to use copyrighted material.

Finding Pictures with Creative Commons

When the first edition of this book came out, Creative Commons was more a dream than a reality. But now, it is a powerful tool for finding media that you can use. The basic premise of Creative Commons is that for many things that people create, they are happy to let other people use them, possibly with restrictions, such as only for noncommercial use. Furthermore, they don’t want to require others to track them down to ask permission. Creative Commons allows content creators to give permission in advance for others to use their work. As a consumer of other people’s work, you can use Creative Commons to find things that you are allowed to use without asking permission. For details about Creative Commons, visit http://www.CreativeCommons.org/.

There are many options for finding media that is licensed with Creative Commons. Pictures are plentiful and can be found with a Google image search (http://images.google.com/) or a search of Flickr (http://flickr.com/). For a Google image search, click on **Advanced Image Search**, look for the drop-down menu labeled **Usage Rights**, and choose **labeled for reuse** (or one of the other options depending on how you want to use the image). For Flickr, click on **Search** (without even typing anything into the search box) and then click on **Advanced Search**. Scroll down to the Creative Commons section and check one or more of the boxes (at a minimum, check the box for **Only search within Creative Commons-licensed content**). With either of these searches, the pictures will be legal for you to use with far fewer restrictions than fair use requires.

Other media are harder to find, but you can find some other things, including sounds (including music in a variety of genres) and videos by visiting http://search.creativecommons.org/.

Finally, you should note that all Creative Commons licenses require you to attribute the source, so you should be sure to note on an opening slide that you used material licensed under Creative Commons and include a references slide that gives a complete citation for all Creative Commons–licensed material you used.

If you are on the Web and you see a picture that you want to use and you have the right to use it—because of fair use, because the picture is licensed with Creative Commons, because the picture is in the public domain, or because you have permission to use it—you should save it to your computer and insert it into your presentation as described earlier. While copying and pasting the picture is an option, you are better off saving and inserting because of the way PowerPoint stores copied pictures and because copying and pasting can cause problems in some versions of PowerPoint. In most browsers you can right-click (or hold down the control key and click on a one-button mouse) on the picture. You should see a fly-out menu with an option for **Save Picture As . . .** or something similar (see Figure 3.4). Make note of where it is saving the picture (and possibly adjust that to put it into the folder with your PowerPoint presentation), and then insert the picture as described previously. Once a picture is in PowerPoint, it is an object, and you can move it around, resize it, or even assign it actions.

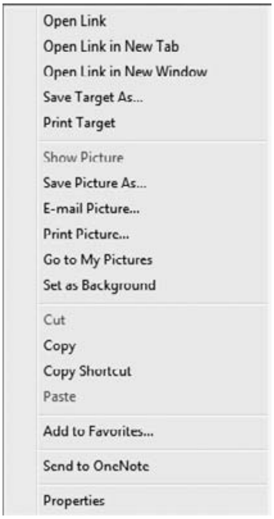


Figure 3.4. Fly-out Menu to Save a Picture from a Browser

Photo Albums

Some of the best presentations have little or no text and are all pictures. You can certainly do this manually by creating slides and adding pictures one at a time to the slides, but recent versions of PowerPoint (sorry, this is only available on Windows) have the Photo Album feature. In 2007 and 2010, the Photo Album works quite well (see Figure 3.5). On the **Insert tab** of the Ribbon, click on the **Photo Album button**. You can navigate to a folder full of pictures, select all the pictures, and click **Insert**. This will then list all your pictures in the dialogue box and give you some options for adjusting the pictures. You will also have options for how the pictures will be laid out on the slide and whether there will be room for captions. Finally, click **Create**, and you will get a new

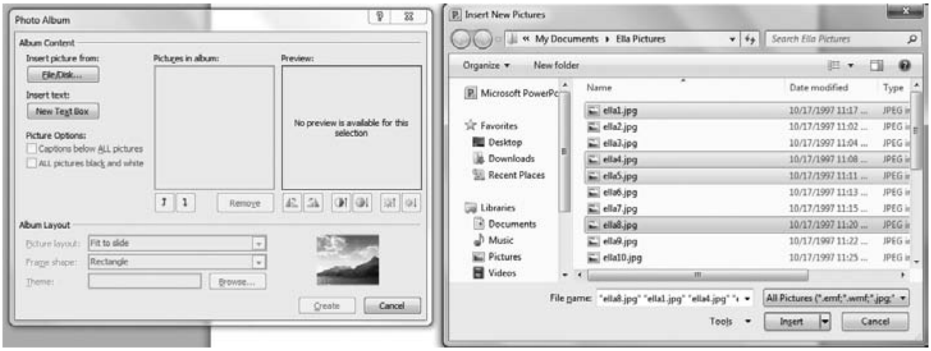


Figure 3.5. Photo Album: Select the pictures you want and click Insert

presentation with all your pictures. The default is one picture per slide taking up the entire slide, but you can use the settings to adjust that.

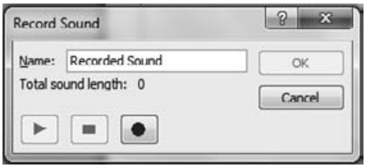
Sounds

PowerPoint presentations can include sounds in a wide range of formats. Like pictures, the sounds can be inserted from clip art or from a file. Sounds also can be recorded, assuming you have a microphone connected to your computer. In older versions, sounds can also refer to a CD track (am I one of the last people who still uses CDs?), but that has been removed from 2010 and 2011. In 2010 (Windows), in the **Insert tab** of the Ribbon, click on the **Audio button** to insert a sound from a file or click on the **arrow below the Audio button** to choose a sound from the clip art library or to record your own sounds. In 2011 (Mac), in the **Home tab** of the Ribbon, click on the **Media button** and select one of the three audio options. In older versions, you can make the appropriate selection by choosing **Movies and Sounds** from the **Insert menu**.

If you use an older version and choose to use a CD track for your sound, then the CD must be in the computer when you are inserting the sound and whenever you are running the presentation. This works well if you are presenting something to an audience, but it works poorly if you are putting the presentation on several computers for your students. A better alternative might be to import the CD track into your computer, but you must be careful about copyright guidelines, which could limit the amount of a song you may use to 10 percent of the song or 30 seconds, whichever is less.

Recording your own sounds is a good option because, in an educational setting, much of the sound that is valuable is text that is read. If you teach students who are still learning to read or students with special needs, providing a button to have text read can be very useful. If you teach proficient readers, allowing new or difficult vocabulary to be read can be very helpful. When you choose to record a sound, you will get a dialogue box like the one in Figure 3.6. (Note that this dialogue box will look a little different depending upon which version of PowerPoint you are using.) Be sure that you give your sound a specific name so all your sounds are not named “Recorded Sound.” Click on the **circle** to begin recording your sound and click on the **square** to stop recording. Click on the **triangle** to listen to the sound.

The biggest problem with sounds is inserting them into your presentation on one computer only to find that they don’t play on another computer. This


Record Sound

Name: Recorded Sound

Total sound length: 0

Figure 3.6. Record Sound Dialogue Box

usually has to do with whether the sounds are linked or embedded. In 2010 and 2011, sounds are generally embedded (meaning that this is rarely a problem in the newer versions). Additionally, if sounds are embedded in 2010 or 2011, some older versions of PowerPoint might not be able to play the sounds.

Linking and Embedding Sounds (PowerPoint 2007/2008 and Earlier)

When you include some elements in PowerPoint, they are embedded in your PowerPoint presentation. That means that the element becomes part of the PowerPoint file. Other elements are inserted as links to other files. Pictures are generally embedded in the presentation. Movies are always links to other files in older versions of PowerPoint. This means that if you insert a picture into a PowerPoint presentation, you no longer need the original picture. The PowerPoint presentation has the picture inside it, so you can move the presentation to another disk, email the presentation to a friend, or delete the original picture, and the presentation will still show the picture. If you insert a movie into a PowerPoint presentation using 2007/2008 or earlier, the movie is not part of the PowerPoint file. The PowerPoint presentation contains a pointer to the file. If you move the PowerPoint presentation to another disk, email it to a friend, or delete the original movie, your presentation will no longer play the movie.

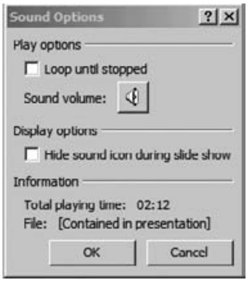
Sometimes sounds are embedded and sometimes they are linked in PowerPoint 2007/2008 and earlier. Two things affect whether they are embedded or linked: the type of sound and the size of the sound. Sounds of type Audio Format (*.au), Audio Interchange File Format (*.aif or *.aiff), Musical Instrument Digital Interface (*.mid or *.midi), MP3 Audio file, (*.mp3), and Windows Media Audio (*.wma) are always linked. Sounds of the type Waveform Audio (*.wav) can be linked or embedded depending on the size of the sound. Waveform Audio sounds that are greater than the size of the **Link sounds with file size greater than** setting will be linked. Waveform Audio sounds that are smaller than that setting are embedded. You can change this setting by going to the **General tab** of your **Preferences** or **Options** (the place you made many of the changes to settings in Chapter 2) or the **Advanced tab** of **PowerPoint Options** in PowerPoint 2007 (you'll have to scroll down to see this option). Look for the number next to **Link sounds with file size greater than**. This number is in kilobytes and usually starts at 100. Most clip sounds (such as boings and beeps and applause) are far less than 100KB, but longer sounds can be larger. I generally set this setting to 50000KB to ensure that most of the sounds I use will be embedded.

In the previous chapter, I suggested that you create a folder for your PowerPoint project and save your presentation there before you do anything. This is to prevent problems with linked files. It is fine to have linked files in your PowerPoint presentation, whether they are sounds or movies or other files. The key is to make sure that the links work when you move your presentation to another disk or another computer. If you have saved your PowerPoint presentation to a folder and you have saved any linked files to that same folder before linking to those files, your presentation should be portable as long as you move all the files together (i.e., move the whole folder).

Linked files become a particular problem with sounds or movies taken from the Clip Organizer. On different computers with different operating systems (even different versions of Windows), even the standard clip sounds can be located in different locations. In addition, different computers have different clip sounds loaded on them. If you insert a sound from the Clip Organizer and the sound is linked, there is a good chance that the sound will not play on other computers. To alleviate this, you should find out where the sound is located on your computer and copy the sound you intend to use into your folder with the presentation.

If you have inserted a sound and it is embedded, you do not need to worry about where the sound file is. If it is linked, you do need to worry about it. While knowing the size of the sound, the size of your setting for **Link sounds with file size greater than**, and the type of sound will help you predict whether the sound will be linked or embedded, you will want to check to be sure.

Once you have inserted a sound, click on the sound icon and choose **Sound Object** from the **Edit menu**, or, in 2007, click on the **Options tab** in the Ribbon and click the **arrow** in the corner of the **Sound Options group** to see the **Sound Options dialogue box**. At the bottom of the dialogue box, you will see "File:" and either "[Contained in presentation]" or a path to the file (see Figure 3.7). The former indicates an embedded file, and the latter indicates a linked file. While the path to the file might help you locate the file (so you can copy it to your project folder), the dialogue box is generally too small to show the entire path.



☐ Loop until stopped

Sound volume:

☐ Hide sound icon during slide show

Total playing time: 02:12

File: [Contained in presentation]

Figure 3.7. Sound Options Dialogue Box

Hypertext Links

Before version 97, PowerPoint was simply a tool to present material. Presenters would stand up in front of an audience and go through slide after slide. PowerPoint's advantage was that media (text, graphics, sounds, videos, etc.)

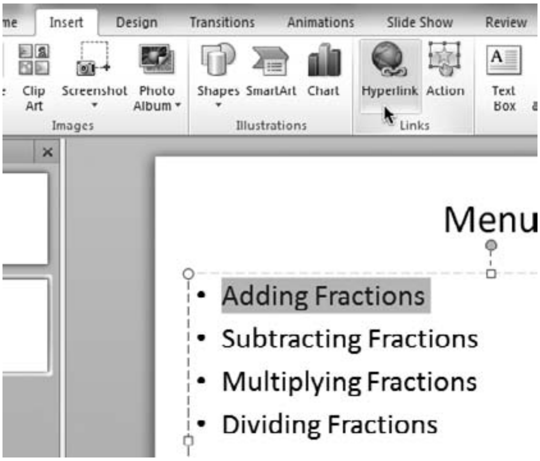
could be incorporated into the presentation to add bells and whistles and to present information in a variety of formats. PowerPoint 97 changed all that. OK, PowerPoint 97 changed very little of that because most people still use PowerPoint for linear presentations. However, PowerPoint 97 allows you to use it in different ways.

One tool that was added to PowerPoint was hyperlinks. Hyperlinks allow you to create presentations that are nonlinear. In modern times, everyone is used to clicking on text to jump somewhere, and PowerPoint gives you that capability (the Web, with its hyperlinks, was just in its infancy when PowerPoint 97 came out). You can create hypertext links to other places in your presentation, to Web pages, and to other files.

Linking within Your Presentation

Being able to link to other places in your file makes PowerPoint a more powerful presentation tool, but it also gives you the ability to create projects that users navigate themselves. Presentations no longer have to go from one slide to the next to the next to the next. You can make them go anywhere. If you are giving a presentation, you might want to link to slides with the answers to questions you anticipate being asked. If you are creating something for your students, you might use a menu structure in which students choose a topic from a menu and, when finished with that topic, jump back to the menu.

To link to another place within your PowerPoint presentation, create a few slides first, perhaps creating a menu slide that will link to the other slides. Highlight the text you want to link and choose **Hyperlink** from the **Insert tab** of the Ribbon (**Insert menu** in older Windows versions and in all Mac versions). Be sure to highlight the text; if you don't, PowerPoint will make a single word the link. See Figure 3.8.

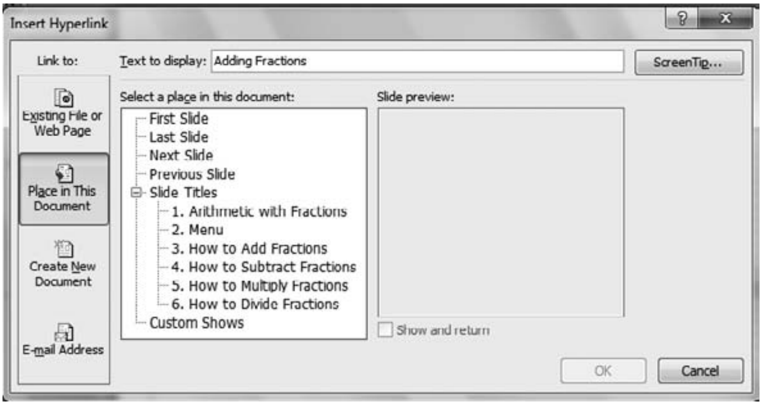


Menu

- Adding Fractions
- Subtracting Fractions
- Multiplying Fractions
- Dividing Fractions

Figure 3.8. Insert Hyperlink in PowerPoint 2010

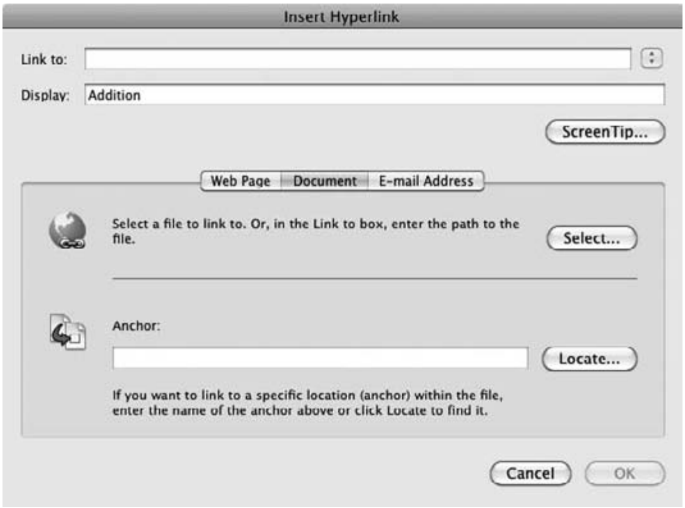
The exact format of the dialogue box that you see will vary based on which version of PowerPoint you use, but it should look very similar to Figure 3.9 (Windows) or Figure 3.10 (Macintosh).


Insert Hyperlink

Text to display: Adding Fractions

Select a place in this document:
- First Slide
- Last Slide
- Next Slide
- Previous Slide
- Slide Titles
  - 1. Arithmetic with Fractions
  - 2. Menu
  - 3. How to Add Fractions
  - 4. How to Subtract Fractions
  - 5. How to Multiply Fractions
  - 6. How to Divide Fractions
- Custom Shows

Figure 3.9. Insert Hyperlink Dialogue in PowerPoint 2010


Insert Hyperlink

Link to:

Display: Addition

Select a file to link to. Or, in the Link to box, enter the path to the file.

Anchor:

If you want to link to a specific location (anchor) within the file, enter the name of the anchor above or click Locate to find it.

Figure 3.10. Insert Hyperlink Dialogue in PowerPoint 2011

In the Windows versions of PowerPoint, you will see tabs for “Existing File or Web Page,” “Place in This Document,” “Create New Document,” and “E-mail Address” (see Figure 3.9). In Mac versions, you will see tabs for “Web Page,” “Document,” and “E-mail Address” (see Figure 3.10). To link your text to another slide, choose **Document** or **Place in This Document**. Clicking on one of the tabs (on the far left in Windows and the middle of the dialogue box on Mac) changes the rest of the dialogue box based on your selection.

If your screen looks like Figure 3.10, click on the **Locate…** button in the **Anchor section** of the dialogue box. Now your screen should look like part of Figure 3.9 with choices to link to "First Slide," "Last Slide," "Next Slide," "Previous Slide," "Slide Titles," and "Custom Shows." If you don't have any choices for slides under "Slide Titles," click on the triangle or plus sign next to "Slide Titles" and the names of all your slides should appear. This is where you can choose a particular slide to link to. Click on the slide title to which you want to link and click **OK**. The highlighted text should become underlined and change color (based on the color template you are using).

Some of you tried to click on your text, and it didn't take you anywhere. That's OK. As you know, PowerPoint has different views or modes in which you can see your slides. We can edit our slides in Normal View (sometimes called Edit View), but we run our presentation in Slide Show View. Our links will only work in Slide Show View. Choose **From Beginning** (**From Start** in PowerPoint 2011) or **From Current Slide** in the **Slide Show tab** of the Ribbon, or choose **View Show** from the **Slide Show menu** to take you into Slide Show View (that's the view where you only see your slide on the screen with no menus or toolbars). Now you should be able to click on your hypertext link to take you to another slide. You'll notice that when you point to a hypertext link (or any element of PowerPoint on which you can click), your cursor changes from an arrow to a hand. Watch for that change in Slide Show View so you can see what is clickable and what is not.

Once you have linked one part of a menu, it is easy to follow the same steps to link the rest of the items in the menu: Highlight the text you want linked, choose **Hyperlink . . .** from the **Insert menu**, choose **Document** or **Place in This Document**, click on the **plus sign** or **triangle** if necessary to see the titles of your slides, click the appropriate slide title, and click **OK**.

Note that older versions of PowerPoint (2007/2008 and earlier) have a bug when hyperlinking to certain slides. If the titles of your slides have commas, PowerPoint will not be able to link to them. This has to do with the way PowerPoint stored hyperlinks (using commas to separate parts of the hyperlink). To work around this, you have to remove the commas in the title and reinsert the hyperlink. In some versions, you can even put the comma back after the hyperlink has been reinserted; it just can't be there when the hyperlink is first created.

Linking outside Your Presentation: Web Pages and Other Documents

While linking within your presentation allows your presentation to be interactive, linking outside your presentation allows the interactivity to extend beyond PowerPoint and allows your PowerPoint document to serve as a springboard to other resources. During a lecture, you can jump to a relevant website via a link in your presentation or jump to any other document on your computer. An interactive project can include some of the content within the PowerPoint project and use hyperlinks to connect to Web pages with more details, Word documents with extensive rubrics formatted as tables, movies or sounds in formats that PowerPoint cannot recognize, etc.

To link to a Web page, choose the **Existing File or Web Page tab** in Figure 3.9 or the **Web Page tab** in Figure 3.10. From there, simply type the URL (uniform resource locator; that's the Web address) in the box labeled "Address" or "Link to." Be sure to include the complete address (which generally starts with "http://"). Alternatively, click on the **Browse the Web** icon (it looks like a globe with a magnifying glass) to launch your Web browser (Windows versions only). In some versions of PowerPoint, wherever you browse will automatically be inserted as the link; in other versions, you will have to copy the URL and paste it into PowerPoint. Note that if you have to paste and your Edit menu isn't active, you usually can use the keyboard shortcut (control-V in Windows or command-V on a Macintosh) to paste.

To link to another document, choose the **Existing File or Web Page tab** in Figure 3.9 or the **Document tab** in Figure 3.10. Just browse for the file within the window or click on the **Locate . . . button** or the **Browse for File icon** (it looks like an open folder with an arrow opening it) to get the standard **Open File dialogue box**. In Windows, you might have to pick files of type "All Files" to be sure you can see documents that PowerPoint does not default to showing you.

Note that when you are choosing a file, you are creating a link. Just like linked sounds, if you want PowerPoint to be able to open the document when the presentation is moved to another computer, you should put the file in the folder with your PowerPoint file before linking to it.

Buttons

Sometimes you want your users to click on text to follow a hyperlink, and sometimes you want them to click on a button. PowerPoint provides buttons with a few different icons for different purposes. In 2010, choose **Shapes** from either the **Home** or **Insert tabs** on the Ribbon. In 2007, choose **Shapes** from the **Insert tab** or click on the bottom arrow next to the various shapes in the **Drawing section** of the **Home tab**. In 2011, click on the **Shape button** of the **Home tab** of the Ribbon or go to the **Insert menu** and choose **Shape . . .** to get to the shape section of the Media Organizer. In 2011 and all older versions, choose **Action Buttons** from the **Slide Show menu**, and a fly-out menu will appear with either icons for buttons or names of buttons. In most versions, the action buttons can be found at the bottom of the list of shapes.

Figure 3.11 shows the 12 different kinds of buttons: Previous Slide, Next Slide, First Slide, Last Slide, Home, Information, Last Slide Viewed, Movie, Document, Sound, Help, and Custom.

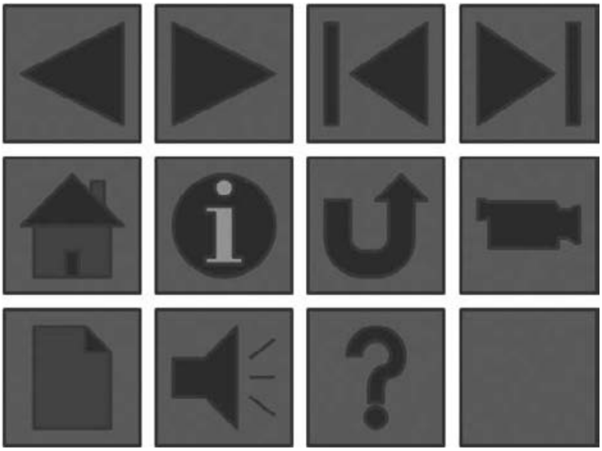
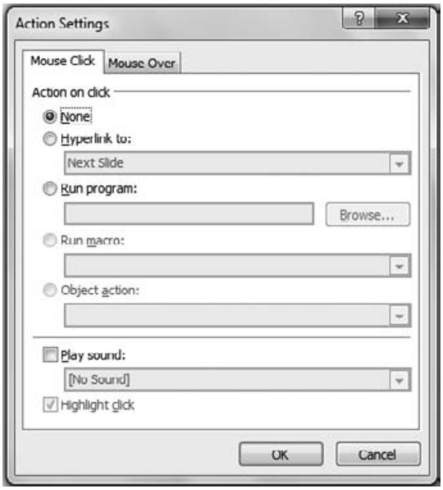


Figure 3.11. The 12 Types of Buttons

The button icons do not have to correspond to the action the button will perform, but good rules of design dictate that the icon should make sense for what is going to happen when the button is pressed.

Once you select a button, your cursor will change to a plus sign. You can either click on your slide and a standard size button will appear, or you can drag the mouse to create a button of any size you like. Don't worry if the size isn't perfect; you can always click on the button and drag it from the handles to change the size.

Once you create the button, you will be prompted with the Action Settings dialogue box shown in Figure 3.12.



Action Settings

Mouse Click | Mouse Over

Action on click

● None

○ Hyperlink to:

Next Slide

○ Run program:

Browse...

○ Run macro:

○ Object action:

□ Play sound:

[No Sound]

☑ Highlight click

OK Cancel

Figure 3.12. Action Settings Dialogue Box

This dialogue box allows you to have your button do many of the same things you could do with a hyperlink. Unfortunately, the same things are done in a slightly different way.

To link to another slide, you will choose **Hyperlink to** and pick from the drop-down menu. If you chose an icon for your button, **Hyperlink to** might already be chosen with PowerPoint's best guess for what you want to do. If PowerPoint guessed correctly, just click OK; otherwise pick something else from the drop-down menu.

Like the hyperlinks for text, you can choose **Next Slide**, **Previous Slide**, **First Slide**, **Last Slide**, and **Custom Show**. You can also choose a specific slide by choosing **Slide . . .**, which will prompt you for the slide to link to.

In addition to the choices that were available for hyperlinks for text, you can also choose **Last Slide Viewed**, which takes you to the slide that took you to the current slide. Imagine a quiz with several questions. Each wrong answer leads to a slide with the word "Wrong" (or some more gentle reminder that the incorrect answer was chosen) on it. The "Wrong" slide can contain a button that returns to the last slide viewed, so it always returns to the question that was just answered, no matter which question that is. Another additional option is **End Show**, which will quit out of Slide Show View.

The **URL . . .** choice will allow you to type in a Web address, but it does not give you the option to browse for a Web address. **Other PowerPoint Presentation** not only lets you choose another PowerPoint file, but it also lets you pick which slide in that presentation the button will take you to. Finally, **Other File…** is just like browsing for a file when choosing **Existing File or Web Page** or **Document** with a hypertext link.

Once you have chosen where to "Hyperlink to," click **OK**. If you ever want to change what the button does, click on the button to select it and choose **Action** from the **Insert tab** of the Ribbon (2010 and 2007), **Action Settings** from the **Slide Show tab** of the Ribbon (2011), or **Action Settings** from the **Slide Show menu** (older versions).

Remember that buttons, like hyperlinks, only work in Slide Show View. If you click on them in Normal View, you will select them. Clicking on them in Slide Show View will do whatever action you set the button to do.

Now that you have seen a few things that buttons can do that hyperlinks cannot, I'll let you in on a little secret: Any PowerPoint object, including text, can have the same action settings as a button. If you click on a picture or a shape drawn with the Draw tools, or you highlight text, you can add or edit the action settings the same way you would for a button. Do you want to have a menu with pictures? Just put pictures on slides and set their action settings to go somewhere else. Do you have a geometry lesson, and you want something to happen when the students click on a particular shape? Just draw the shape and set the action settings.

In versions other than 2007 and 2010, you can right-click on any shape or selected text and choose **Action Settings** from the menu that pops up. In 2007 and 2010, **Action Settings** doesn't appear on the right-click menu. You can, instead, choose **Hyperlink**. For all buttons and any object that already has an action, **Hyperlink** will take you to the Action Settings Dialogue. For everything else, **Hyperlink** will take you to the Hyperlink Dialogue.

Text for Buttons

In some cases, an icon is enough to let the user know what the button does, but words are often clearer. Sometimes the best choice for a button is a "Custom" button (that's the blank one with no icon) and some text. To add text to a button, right-click on the button and choose **Edit Text** or **Add Text**. You should see the cursor flashing inside your button waiting for you to type whatever text you want to appear in the button. In some versions, you can just click on the button to select it and start typing.

The text in a button can be formatted for font, size, style, and color, just like any text object. If the text is too big to fit in the button, you can change the font size, or you can change the size of the button by dragging from the handles.

Warning! When a button has text, it is easy to change the action settings for the text instead of the entire button. Your clue that you have done this is that the text will change color and be underlined if it has action settings associated with it. Figure 3.13 shows a menu button that has the link associated with the text, not the entire button (sorry, since this book is black and white, you might not see the color change in the figure).

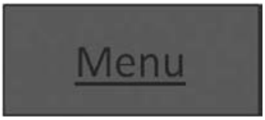


Figure 3.13. Button with Action Settings for the Text

The problem with this is that if a user clicks anywhere on the button except the text, the button will not work. This situation can be even worse if the button itself has action settings to do one thing and the text of the button has action settings to do something else. If this happens, highlight the text in the button, choose **Action** from the **Insert tab** of the Ribbon (2010 and 2007), **Action Settings** from the **Slide Show tab** of the Ribbon (2011), or **Action Settings** from the **Slide Show menu** (older versions), and click **None** for the action.

To be sure that you are setting your action settings for the button itself and not just the text, click once on the button. If you see a flashing cursor in the text, click on the button again, but be sure to click somewhere outside of the text. Watch the shape of the cursor for the mouse. If it is the text cursor (known as the "I bar" because it looks like a capital I), then you are clicking in the text. Otherwise you are clicking outside of the text. Once you have selected the button, and not the text, you can set the action settings for the entire button.

Sound for Buttons

In Figure 3.12, you will notice that you can check **Play Sound** at the bottom of the Action Settings dialogue box. From the drop-down menu below that, you can choose from a few of the canned sounds that come with PowerPoint. You can also pick a sound file by choosing **Other Sound…** from the bottom of the list. Note that in some versions of PowerPoint (including 2010 and 2011), certain VBA functions (including `MsgBox` and `Debug.Print`) interfere with sounds playing, so if you want to both run a macro and play a sound from the Action Settings dialogue box, the sound might not play.

You might notice, however, that there is no option for recording your own sound. Because this is the most useful option for sounds for educational purposes, it is important to be able to do this. You might want a button to say where you are going when you click on it, you might want a button to read the text on a slide, or you might want to pronounce a vocabulary word when the word is clicked. This is all possible in PowerPoint.

Earlier in this chapter you learned how to record a sound to place it into your presentation by clicking on the **Audio button** in the **Insert tab** of the Ribbon (2007 and 2010) or the **Media button** of the **Home tab** of the Ribbon (2011). Unfortunately, you did not have a choice about the icon used for the sound. The icon was always a little speaker. Perhaps you can compromise and use that icon instead of a button, but that will not work for vocabulary words. The solution is to add the sound with the speaker icon and then delete the icon. Remember that I warned you to always give your sound a sensible name when recording it? Now is the time you will use that name. Once you have recorded a sound, it is part of the presentation. It remains part of the presentation even if you delete the icon that plays the sound.

For PowerPoint 2007/2008 and earlier, attaching the sound to a button was very easy. Unfortunately, PowerPoint 2010/2011 has eliminated the easy way to do this. Fortunately, there are some workarounds; it's just not as easy as it used to be. In the hopes that this feature will return to PowerPoint in a later version or in a service pack from Microsoft, I'll list the method that used to work first, followed by some suggestions for workarounds.

If you want a sound associated with a button, word, or any other PowerPoint object, perform the following steps:

1. Record the sound as described in the Sound section (pp. 29–30). Be sure to give the sound a name other than "Recorded Sound."
2. Click once on the sound icon to select it and hit the Delete or Backspace key on your keyboard to delete the icon.
3. Select the object or text you want associated with the sound and choose **Action** from the **Insert tab** of the Ribbon (2010 and 2007), **Action Settings** from the **Slide Show tab** of the Ribbon (2011), or **Action Settings** from the **Slide Show menu** (older versions).

4. Check the **Play Sound** check box in the Action Settings dialogue box and choose your sound from the drop-down menu. Your sound will be listed with the name you gave it. Note that you might have to scroll up or down to find your sound, as it might be in the list in alphabetical order or, in most versions, at the top of the list of sounds.

If you are using 2010 or 2011, you might have to use a workaround to get this to work because recorded sound no longer shows up in the list of sounds in the Action Settings dialogue box. You can try one of the following workarounds:

Record sound with another program. Many programs can be used to create sound files. Windows comes with Sound Recorder, and Mac comes with GarageBand. Unfortunately, neither of these programs creates Waveform Audio (*.wav) sounds, the type of sound that PowerPoint needs to include as an action setting. Sound Recorder creates Windows Media Audio (*.wma) files, and GarageBand creates Advanced Audio Coding (*.aac) or MPEG Audio Layer III (*.mp3) files. You could try one of many other programs, including the free Audacity (http://audacity.sourceforge.net/), or you could use what comes with your computer and convert the file using a converter, such as Zamzar (http://zamzar.com/). Once you have a WAV file, it is best to put it into the folder where your PowerPoint is. Then, you can choose **Other Sound . . .** from the bottom of the list of sounds in the **Play Sound section** of the **Action Settings** dialogue box. Then, navigate to the file you just saved to insert it. Once you do that, that file will show up near the top of the list of sounds in the Action Settings dialogue box.

Record sound and extract it from the PowerPoint file. Starting with PowerPoint 2007/2008, PowerPoint files are really a bunch of files packed together. A PowerPoint Presentation (*.pptx), for example, is really a folder full of folders, Extensible Markup Language (*.xml) files, media files, etc. Except for the most advanced users, you would rarely have occasion to, or want to, look at these files. However, buried deep in this complex collection are all the media files from the presentation. They might include pictures (*.png, for example), videos, and sounds (*.wav, for example). All you have to do is crack open this PowerPoint file and get the tasty nuggets hidden within. Be sure that you have file extensions showing (as described in Chapter 2, see p. 14). Next, it is best to make a copy of the file to be sure that you don't mess anything up. Next, you will need to change the file extension from pptx or pptm or ppsx or ppsm to zip. For example, if you have the file MyPrez.pptm, you can change it to MyPrez.zip. In Windows, this new file acts like a folder so you can just double click on it to see what is inside. In Mac, you will have to right-click on the ZIP file, select **Open With** and choose **Archive Utility**. This will turn your file into a regular folder that you can open. Open the ZIP file or the folder, and open the folder named "ppt" within and the "media" folder within that. You should now see a list of all the media in your presentation. Unfortunately, the sounds are all named "media1.wav," "media2.wav," etc., rather than any real names. Any recorded sound will have the .wav extension, and the most recent sound you added should have the highest number. Copy the sound to your computer (preferably the folder where your PowerPoint file is) and give it a name that makes sense to you (without changing the .wav extension). Now, you can choose **Other Sound . . .** from the bottom of the list of sounds in the **Play Sound section** of the **Action Settings** dialogue box. Then, navigate to the file you just saved to insert it. Once you do that, that file will show up near the top of the list of sounds in the Action Settings dialogue box.

Use the sound icon. The previous two workarounds give the exact same results as the original method of attaching a sound to a button; they are just harder than the original method. This workaround and the following ones work differently but might be sufficient for your purposes. The sound icon isn't all that bad. You might find that it is good enough to indicate to your students that they can click to hear sound. The drawback of this (and the following workarounds) is that the sound icon can't play a sound and perform any other actions (such as hyperlink to another slide or run VBA code).

Change the picture of the sound icon. It might be that you just don't like the sound icon but don't really need to have a regular button. In that case, you can right-click on the sound icon and choose **Change Picture . . .** You can find any picture on your computer to be the clickable object. When you choose a picture, the sound icon will be replaced with that picture. You might choose to have a picture of your face or a cartoonish face (or anything else that you want) that you use as an icon to indicate that the narration can be read on each slide.

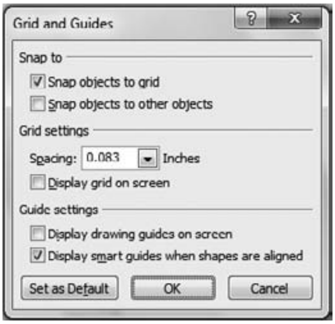
Use a trigger animation. Trigger animations will be described in more detail later, so this workaround will be brief. You can create the sound and drag the icon off the viewable area of the slide; you can see it in Normal View, but it won't show up in Slide Show View. Click on the sound icon to select it and go to the **Animations tab** of the Ribbon. You should see a menu in the **Advanced Animation section** named **Trigger** (with a lightning bolt icon). Click on this, and you can choose some other object (such as a button or picture or smiley face or …) to trigger the action of playing the sound.

Make the sound icon invisible and put over other objects. The final workaround is to set the transparency of your sound icon to 100%, making it invisible, but currently this only works in PowerPoint 2011 and not PowerPoint 2010 (other shapes can be made transparent in 2010 but not sound icon shapes). Right-click on the sound icon and choose **Format Shape**. In the dialogue box, click on the **Adjust Picture tab**. Slide the slider for transparency to 100%. One additional step you might need to do is to right-click on the (now invisible) sound icon and choose **Arrange** and **Bring to Front** to make sure the invisible shape is on top of other things. You can now resize the shape and drag it on top of any other objects or text you want. Your users won't see the shape, but when they click on the object or text that it is over, the sound will play.

Aligning Objects and Other Details

If you want your presentations to be effective, you want to pay close attention to the details. It is easy to make sure that your buttons are the same size and your objects are appropriately aligned. If you want true perfection and/or beauty, you might need to hire a professional designer, but there are important educational reasons for paying attention to details without aiming for perfection. The details are beyond the scope of this text so you might want to check out something like Mayer (2006), *The Cambridge Handbook of Multimedia Learning*. The short answer has to do with limited working memory and distraction. As we try to understand something, we only have a limited amount of working memory; i.e., we can only hold in our heads about seven to ten pieces of information at once. Distracting and unrelated pieces of information on the slide use up some of those seven to ten slots. Students seeing extraneous unrelated pictures or misaligned buttons might not be consciously aware of it, but their brains are trying to make sense of those things, distracting them from the real thing they are trying to learn. If a slide has a couple of new pieces of information that students are trying to integrate with their prior knowledge to form a mental model, that's a mentally challenging task, and they need all the slots that their brain has available.

Fortunately, PowerPoint makes it easy to get things the right size and get them lined up just right. In 2007 and 2010, most of what you need is in the **Arrange menu** on the **Home tab** of the Ribbon. First, by default PowerPoint uses a grid so when you drag objects around on the screen, you can only put them at certain intervals. This is controlled by the Grid Settings (go to the **Home tab** of the Ribbon, click on the **Arrange button**, choose **Align** from the drop-down menu, and choose **Grid Settings** from the fly-out menu) in PowerPoint 2010 (see Figure 3.14).



Grid and Guides

Snap to

☑ Snap objects to grid

□ Snap objects to other objects

Grid settings

Spacing: 0.083 Inches

□ Display grid on screen

Guide settings

□ Display drawing guides on screen

☑ Display smart guides when shapes are aligned

Figure 3.14. Grid and Guides Dialogue Box

PowerPoint 2011 only has the first two options: "Snap objects to grid" and "Snap objects to other objects," which can be found in the **View menu** under

Guides. **Snap objects to grid** controls whether you can move objects around anywhere or if they will be constrained to the grid, based on the spacing that is set. With this checked, you can often get objects lined up just by dragging them to where you want them because if you get them close enough, they will snap to the grid. If you are trying to get objects to touch each other (particularly if you are using arrows to point to things), the **Snap objects to other objects** setting will help you do that. Displaying the grids and the guides are ways to help you see if things are lined up as you expected.

Sometimes, even with all the snapping and guiding, objects are not quite lined up. This is where the Align tools are very helpful. In the **Home tab** of the Ribbon, choose **Arrange** and **Align** to see the Align tools shown in Figure 3.15 (similar tools are available in 2011 in the **Home tab**, under **Arrange** and **Align or Distribute**).

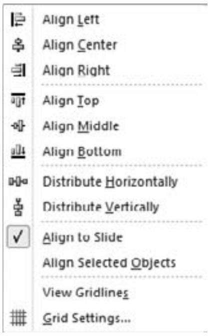


Figure 3.15. Align Tools

To use the Align tools, select one or more objects. If you want to select multiple objects, click on the first one and then shift-click on the next (hold down the Shift key while clicking). If you want the selected objects to be aligned relative to each other (e.g., have their left edges lined up with each other), you can select **Align Selected Objects**. If you want them lined up relative to the slide (e.g., you want them centered on the slide), you can select **Align to Slide**. The top three choices in the menu align objects based on the left, center, or right of the object. When **Align Selected Objects** is chosen, all the objects will be lined up with the leftmost object for **Align Left** and the rightmost object for **Align Right**. With **Align Center**, it moves all the objects to the middle of where they were. The next three choices align objects based on their top, middle, and bottom. When **Align Selected Objects** is chosen, all the objects will be lined up with the topmost object for **Align Top**, the bottommost object for **Align Bottom**, and to the middle of all the objects for **Align Middle**. The next two choices, **Distribute Horizontally** and **Distribute Vertically**, are great for spreading objects out evenly across a slide. This is an excellent choice for getting a row of buttons to be perfectly evenly spaced on a slide.

With a little practice, the Align tools will eliminate a common distraction for your students by getting the objects on the slide lined up.

Misaligned objects are a problem, but it is equally annoying to see objects that should be the same size (either height or width or both) and aren't. There's nothing like a multiple-choice quiz where each choice is a different size button to distract a student from thinking about the question. Fortunately, PowerPoint makes it easy to get shapes to be the same size. There are many ways to do this, but the easiest ways are to copy and paste objects and to manually set the size of objects.

If you copy and paste a shape, the pasted shape will be identical to the original. If you paste it to the same slide, it will be offset from the first, making it easy to drag where you want (hold down the Shift key while dragging to move it vertically or horizontally but not both at the same time). If you paste it to another slide, it will be on the new slide in exactly the same place as the original. I like to set up a button exactly how I want it (with size, color, text, etc.) and then copy and paste that button so I don't have to redo all the settings. I can then change anything about the individual buttons (such as the text) that I want to be different. This is great for getting a "Menu" button on several slides in just the right spot or multiple-choice answers to be exactly the same except for the answer. For a quick copy and paste onto the same slide, try holding down the Control key (Option key on the Mac) and the Shift key and dragging the shape from the edge (not from the text area). This will copy the shape to where you drag it and, by holding down the Shift key, only move it one direction.

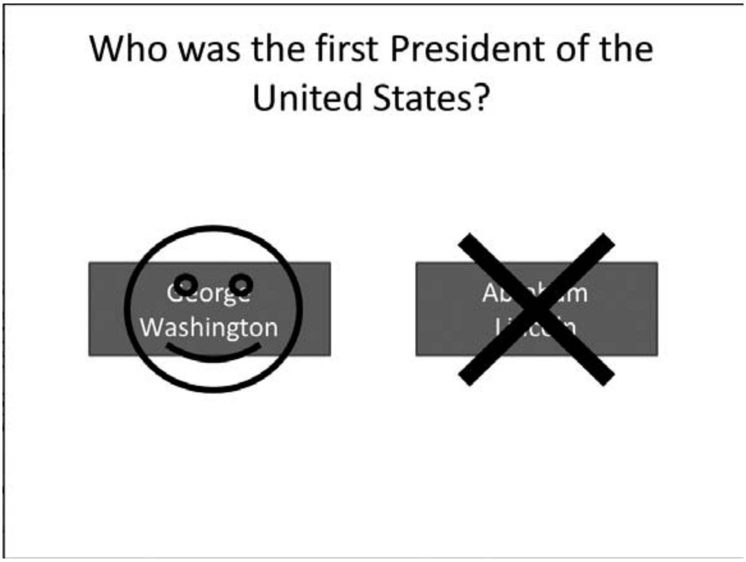
If you already have objects that are the wrong size, or you have objects that are too different to copy and paste, you can easily set the size of the objects. In 2007, 2010, and 2011, the height and width can be found on the **Format tab** of the Ribbon when a shape is selected (if no shapes are selected, the **Format tab** won't be on the Ribbon). In older versions, the height and width can be adjusted by selecting the last item in the **Format menu** (what that item is named will vary based on the object that is selected). In some versions, you can select multiple objects and adjust the height and width at the same time.

It's not always true that objects have to be the same size or lined up perfectly, but it is usually true. If things are different sizes or not lined up, it should be because you made a conscious decision to create them that way, not because of ignorance or laziness. Hopefully, this section took care of the ignorance. You're on your own to deal with the laziness.

Trigger Animations (Windows Only)

This book is not about making fancy or flashy presentations. It is about making interactive presentations. Because of that, the first edition didn't even cover animations at all. However, starting in PowerPoint 2002 (and only available in Windows versions as of now), some of the things that only VBA could do are now available through trigger animations. The basic idea of trigger animations is that you can click on one object to trigger an animation effect for another object. This can be any of the fancy animations or simple entrance and exit animations. Many things still require VBA, but triggers can do some of the basic hiding and showing that used to be VBA's exclusive domain.

Create the slide in Figure 3.16. It is a simple Title Only slide with the question "Who was the first president of the United States?" as the title and two buttons for answers: George Washington and Abraham Lincoln. The correct answer has a smiley face over it, and the incorrect answer has an X over it. Next, set the smiley face to have an entrance animation that is triggered by a click on the George Washington button, and set the X to have an entrance animation that is triggered by a click on the Abraham Lincoln button.



Who was the first President of the United States?

Figure 3.16. Quiz Slide with Triggers

In PowerPoint 2010, animation triggers have been made very easy. Select the smiley face and click on the **Animation tab** of the Ribbon. Choose one of the entrance animations, such as **Appear**. Entrance animations are the ones in green, emphasis animations are in yellow, and exit animations are in red. Under the **Advanced Animation section** of the Ribbon, you will see a lightning bolt followed by the word "Trigger" (if your window is too narrow, the word "Trigger" might not be there). Click **Trigger** and **On Click of** and choose one of the objects named Action Button. The objects in the list are named based on the type of object and in the order they were added to the slide, so the names aren't entirely meaningful and it might take a bit of trial and error to get the trigger to be on click of the correct object. See Figure 3.17. Then repeat this for the X. When you run the slide show, the smiley face and the X should be hidden.

A click on the correct answer will trigger the smiley face to appear, and a click on the incorrect answer will trigger the X to appear. Any shape that has a trigger animation will have a small lightning bolt next to it when the **Animations tab** on the Ribbon is selected. You can delete the trigger animation by clicking on the lightning bolt and hitting the Delete key on your keyboard.

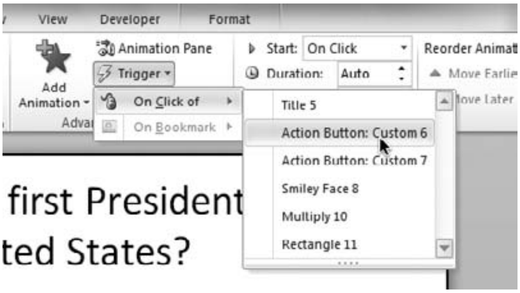
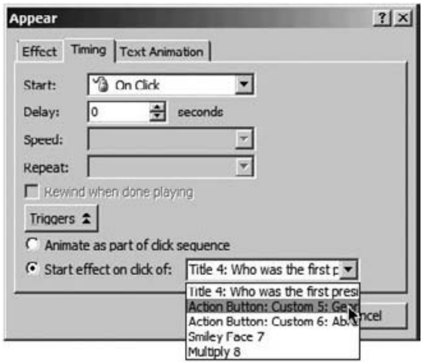


Figure 3.17. Create a Trigger Animation

In older versions of PowerPoint, select the smiley face and click on **Custom Animation** in the **Animations tab** of the Ribbon (2007) or right-click on the smiley face and choose **Custom Animation** from the fly-out menu. The Custom Animation task pane will pop up on the right of the screen. Click **Add Effect** and choose one of the Entrance effects. The animation should show up in the list of animations in the middle of the Custom Animation task pane. The one you just added should be selected; if it is not, click on it. It should have a box around it and an arrow next to it. Click the arrow to bring up the menu. Choose **Timing…** to see a dialogue box. Click on **Triggers**, choose **Start effect on click of:**, and pick the correct shape from the drop-down list. See Figure 3.18.


Appear

Effect | Timing | Text Animation

Start: On Click

Delay: 0 seconds

Speed:

Repeat:

□ Rewind when done playing

Triggers

○ Animate as part of click sequence

● Start effect on click of: Title 4: Who was the first p

Title 4: Who was the first presi
Action Button: Custom 5: Ge
Action Button: Custom 6: Ab
Smiley Face 7
Multiply 8
ncel

Figure 3.18. Create a Trigger Animation in PowerPoint 2007

My friend Steve Rindsberg (Microsoft PowerPoint MVP and keeper of the PPT FAQ at http://www.pptfaq.com/) reminded me that Mac versions of PowerPoint can do triggers: “All you need to make it work on a Mac is a PC.” That is, Mac versions of PowerPoint can’t create triggers, but if you are on a Mac and have a presentation that had triggers created in a Windows version of PowerPoint, they will work on the Mac.

The quiz illustrated in this section is one simple use of triggers. Another use of triggers is to have descriptions or definitions appear when parts of a diagram are clicked. An outstanding example of this showing descriptions of the organelles of a plant cell was created by Lauren Johnson and can be found at http://office.microsoft.com/en-us/templates/interactive-plant-cell-TC030003196.aspx?CTT=5&origin=HA010282527.

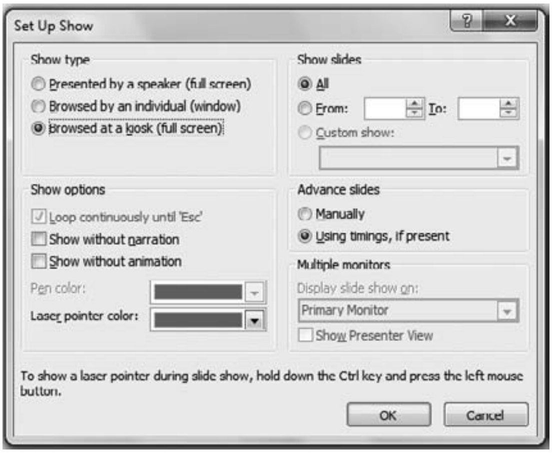
Jeopardy games are very popular. You can search the Web for many templates, or you can try to create your own. A few hyperlinks are all that are needed for a fully functioning Jeopardy-style board, but trigger animations make it a little better. In a realistic Jeopardy board, the dollar amounts will disappear or become inactive after they are clicked. “I’ll take Westward Expansion for $100, Alex.” How do you know that hasn’t already been clicked? If you hyperlink the text ($100) to the correct slide, it will change color when clicked, but it will still show up and still be active. If instead you have a trigger animation, you can make the $100 button disappear. To do this, create your board with buttons for each answer/question. Click on a button and add an exit animation. The trick is that the animation can be triggered by a click on the button being animated. That is, you don’t have to click on some other object to trigger the animation; you can have the object’s animation be triggered by a click on itself. To make it even better, you can have the button trigger the animation AND have a hyperlink to the slide with the answer/question. But wait, there’s more! I know what you are thinking: in theory, this is nice, but how am I going to keep track of all those shapes when I’m setting up the triggers. The good news is that you don’t have to. Create the first shape on the board and set up its trigger animation to disappear when it is clicked. Copy and paste (or control-drag) to create a grid of all the shapes. If you set the trigger properly for the first shape to be triggered by a click on itself, all the other shapes will be triggered by clicks on themselves, too. Setting up the animations for the whole board will take you two minutes. Next, you can put the dollar amounts in the buttons and set up the hyperlinks (you can’t do that automatically).

A Jeopardy game is a great tool for review in class, and once you set it up, you can use it over and over again. Additionally, you can create a variety of other games and interactive activities with triggers. Triggers won’t let you keep score, won’t judge answers that are typed, and won’t impact other slides. For those things, you’ll need VBA. The great thing is that the VBA can be added onto something that uses triggers, so when you reach the limits of triggers, you just add VBA without subtracting what you have already done.

Controlling Navigation with Kiosk Mode

Now that you can create trigger animations and buttons and hyperlinks to take users where you want them to go, you might not want them to go anywhere you don’t specify. Normally in PowerPoint, a mouse click, the space bar, the right arrow, and the Page Down key all move you to the next slide. If you have carefully planned choices for the users, you don’t want them to mess that up by clicking and going to the next slide. The solution is Kiosk mode.

Choose **Set Up Slide Show** or **Set Up Show** from the **Slide Show tab** on the Ribbon or the **Slide Show menu** to get the dialogue box similar to Figure 3.19. In this dialogue box, click on **Browsed at a Kiosk (full screen)**.



Set Up Show

Show type
○ Presented by a speaker (full screen)
○ Browsed by an individual (window)
● Browsed at a kiosk (full screen)

Show slides
● All
○ From: To:
○ Custom show:

Show options
☑ Loop continuously until 'Esc'
□ Show without narration
□ Show without animation
Pen color:
Laser pointer color:

Advance slides
○ Manually
● Using timings, if present

Multiple monitors
Display slide show on:
Primary Monitor
□ Show Presenter View

To show a laser pointer during slide show, hold down the Ctrl key and press the left mouse button.

Figure 3.19. Set Up Show Dialogue Box to Select Kiosk Mode

You now have complete control over the user. The only navigation key that will work when in Slide Show View is the Escape key, which will exit the show. This means that you must have buttons or hyperlinks to do anything. You cannot rely on the user to click the mouse anywhere to advance to the next slide because clicking will only work if the user clicks on a button or hyperlink.

One difficulty with Kiosk mode is animation. Animation in PowerPoint can be triggered, automatic (With Previous or After Previous), or manual (On Click). Triggered and automatic animation works fine with Kiosk mode. Manual animation does not. If the user has to click or hit the space bar to activate animation (such as to have the next line of a bulleted list fly in from the left), this will be blocked by Kiosk mode. The solution is to make all your animation automatic or triggered.

If you choose to animate text, whether or not you use Kiosk mode, you should animate your navigation buttons as well. Have them appear on the screen after all the text has appeared. By doing this, users won’t click a button to go to another slide before all the text has shown up on the current slide.

When you are still working on your presentation, Kiosk mode can be very annoying. You certainly want to try it out, but you might want to turn it off until you are almost done with your presentation so you have the ability to skip around in ways you don't want your students to.

Finally, Kiosk mode has another feature that sometimes works and sometimes doesn't. If a presentation set to Kiosk mode is idle for more than five minutes, it is supposed to return to the first slide. In some installations of PowerPoint, the five-minute timing is not very accurate, and in other installations, it doesn't work at all.

Saving as a PowerPoint Show

Once you have created a presentation for others to use, you do not necessarily want them to edit the presentation or even look at it in Normal View. You might want to save your presentation as a PowerPoint Show (*.ppsx, *.ppsm, or *.pps). If you double-click on a normal PowerPoint file, it will open in Normal View, where you can scroll through all the slides and edit them. If you double-click on a PowerPoint Show, it will open in Slide Show View. In addition, when you exit the show (by getting to the end of the show, hitting the Escape key on the keyboard, or clicking on a button tied to the "End Show" action), a PowerPoint Show will quit out of PowerPoint altogether and not return to Normal View. Chapter 2 described the mechanics of saving your file in another format, such as a PowerPoint Show, so refer to that chapter and simply choose one of the PowerPoint Show types as the type of file.

Don't worry. If you have saved as a PowerPoint Show, you can still edit the file; you just can't get to Normal View by double-clicking it. You first have to open PowerPoint and choose **Open** from the **File tab** on the Ribbon (2010), from the **Office button** (2007), or from the **File menu** (2003 and earlier and all Mac versions). You can now edit your presentation and save normally. When you close it and open it again by double-clicking, it will open back up in Slide Show View.

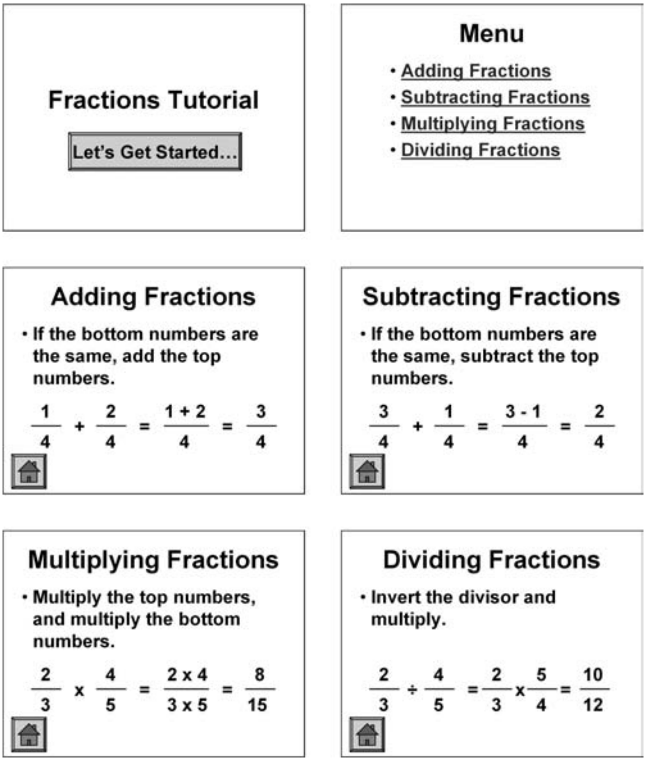
When you combine Kiosk mode with a PowerPoint Show, you have a powerful educational tool. It's not foolproof. Students can use the directions in this chapter to get into it, but it is a good first line of defense to keep the students on task. Give them the file and tell them to double-click on it, and they will be right where you want them to be.

Conclusion

Now you have a basic understanding of the traditional interactive and multimedia features of PowerPoint. You are no longer confined to creating linear presentations that simply go from one slide to the next to the next. You have the full power of buttons and hyperlinks to allow for any of the designs described in Chapter 1, and, with Kiosk mode, you have complete control over where the user goes within your presentation. Now that you have conquered the traditional interactive multimedia features of PowerPoint, you are ready for the next chapter, which will introduce you to the advanced scripting features available to you in PowerPoint.

Exercises to Try

Create a simple tutorial with a title slide, a menu slide, and four content sections. Put a button on your title slide to go to the menu slide. Link the menu to each of the content slides. Include a button on each of the content slides to return to the menu. Put your tutorial in Kiosk mode and save it as a PowerPoint Show. See Figure 3.20.



Fractions Tutorial

Let's Get Started…

Menu

- Adding Fractions
- Subtracting Fractions
- Multiplying Fractions
- Dividing Fractions

Adding Fractions

- If the bottom numbers are the same, add the top numbers.

$$\frac{1}{4} + \frac{2}{4} = \frac{1+2}{4} = \frac{3}{4}$$

Subtracting Fractions

- If the bottom numbers are the same, subtract the top numbers.

$$\frac{3}{4} + \frac{1}{4} = \frac{3-1}{4} = \frac{2}{4}$$

Multiplying Fractions

- Multiply the top numbers, and multiply the bottom numbers.

$$\frac{2}{3} \times \frac{4}{5} = \frac{2 \times 4}{3 \times 5} = \frac{8}{15}$$

Dividing Fractions

- Invert the divisor and multiply.

$$\frac{2}{3} \div \frac{4}{5} = \frac{2}{3} \times \frac{5}{4} = \frac{10}{12}$$

Figure 3.20. Slides for Tutorial with Menu

➪ Create a simple multiple-choice quiz with three questions. Create a slide for each question with buttons for right and wrong answers. Wrong-answer buttons should link to a slide that says “Wrong” and has a button that returns to the “Last Slide

Viewed.” Right-answer buttons should link to the next question and play a positive sound (such as applause or your recorded voice saying “good job”). Put your quiz in Kiosk mode and save it as a PowerPoint Show.

- Create the same quiz as the first but have the right and wrong answers use trigger animations (Windows only) to have a smiley face or a red X appear on the slide along with your voice saying “good job” or “sorry.”
- Create a Jeopardy-style game board with slides for each answer and question. If you use a Windows version of PowerPoint, use trigger animations to have the dollar amounts disappear after each click. If you use a Mac version, make the game board with text boxes and use hypertext links that will automatically change color when clicked.

4

Introducing Visual Basic® for Applications

Introduction

In Chapter 3 you learned some of the traditional multimedia features of PowerPoint, such as pictures, sounds, hyperlinks, action buttons, and trigger animations. These are important features of PowerPoint, and even if you become a VBA expert, you will use these features over and over again. But you might be wondering what VBA is and what it can do for you. This chapter explains what VBA is, describes how VBA fits into the world of object-oriented computer languages, and gets you familiar with some terms and symbols that you will use when you start writing VBA code in the next chapter.

Vocabulary

- Class
- Inheritance
- Method
- Object
- Object-oriented programming language
- OOP
- Parameter
- Property
- VBA
- Visual Basic for Applications

What Is Visual Basic for Applications?

Visual Basic for Applications (VBA) is a very powerful object-oriented programming language that can be used to add to the functionality of Microsoft

Office applications, including Microsoft PowerPoint. You might have gotten stuck on the phrase “powerful object-oriented programming language.” Don’t let that bother you. Your car is a powerful electrical, mechanical, and thermodynamic transportation device, but you can still drive (or if you are too young to drive, your parents can drive, so how hard can it be?). Later in this chapter, you’ll learn what it means to be a “powerful object-oriented programming language,” but remember the premise of this book: You are learning to be a scripter, not a programmer. Just like you don’t need to understand the thermodynamics of the combustion engine to drive your car, you can become a scripter without a degree in computer science.

Originally, PowerPoint was a presentation tool, used by many to enhance lectures, sometimes making them better and sometimes making them worse. PowerPoint served as an automated overhead projector. Slides could be changed with the click of a button. Pictures and sounds could be added. Text could fly onto the screen as points were introduced, saving the need for a piece of paper to cover half the projector (and annoy half the audience).

Enter PowerPoint 97. Starting with that version, PowerPoint was transformed from a presentation tool to an interactive tool. While it still can be used as a presentation tool, it becomes more powerful as an interactive tool. As you saw in Chapter 3, in addition to multimedia elements (pictures, sounds, videos), newer versions of PowerPoint allow interactive elements, including buttons and hyperlinks. You can

- add buttons to control navigation (start your slide show with a menu, for example, rather than requiring linear navigation from slide to slide to slide);
- jump to other slide shows, files, or Web pages; and
- create rudimentary multiple-choice tests (clicking on a button with the correct answer takes the student to a slide that says “correct,” for example).

While PowerPoint’s interactivity is very powerful and useful, it is also very limited. VBA extends this to nearly unlimited dimensions. With VBA, you can change the content and appearance of slides based on student input, you can ask for and process typed input, you can add additional slides, you can hide and show graphics, and much more. You will learn the basics of scripting in VBA beginning in Chapter 5. First, we’ll pause to learn a little bit about what object-oriented programming is.

Note that the VBA features of PowerPoint work in all versions of PowerPoint starting with version 97 other than PowerPoint 2008 for the Mac, but they do not work in the PowerPoint Viewer, when saved as a Web page, or with the Office Web Apps. PowerPoint presentations that use VBA can be placed on the Web, but they must be downloaded from the Web and run directly on a machine with a full version of PowerPoint.

What Is an Object-Oriented Programming Language?

First of all, VBA is a programming language. Don't let this scare you . . . too much. Having a background in computer science and programming would be helpful, and you will not be able to take full advantage of VBA without becoming (at least) a novice programmer. However, this book guides you through some of the basic things you might want to do with VBA without the need of any programming background.

To top it off, VBA isn't just an ordinary programming language; it is an object-oriented programming (OOP) language. An OOP language has three key features: classes, objects, and methods. Classes are types of things, objects are specific things, and methods are what you do to things. For example, there is a class of things called "phone books." The specific phone book on my desk is an object. I can do many things with a phone book, such as look up a person's phone number, turn to a page, put it on a chair for a young child to sit on, etc. All the things that I could do to the phone book are methods. If we convert this phone book example to computerese (computerese is not a real computer language, but it plays one on TV), we might have the following:

```
Dim myPhoneBook As PhoneBook
myPhoneBook.LookUpPerson "John Smith"
```

The first line says that `myPhoneBook` is a specific instance (an object) of the class `PhoneBook`. This tells us that all the things we can do with phone books in general can be done to this specific phone book. Since one of the things that we can do with phone books is look up a specific person, we do that on the second line. `myPhoneBook.LookUpPerson` says that for this specific phone book, call the method (do the action) `LookUpPerson`. Since we need to know which person to look up, this method takes a parameter (information that the method needs to complete its job). That information comes after the method, sometimes in parentheses. Since the information is text, we put it in quotes, too.

Computers are very picky. All the details are important. The dot (that period between myPhoneBook and LookUpPerson) is necessary to tell the computer that LookUpPerson is the thing to do (method) with the object myPhoneBook. Putting the information right after the method with a space in between tells the computer that the stuff after the method is important information (parameters) for knowing what the method should do. The quotes tell the computer that what's inside them is text. Leave out any detail, and nothing will work.

Another critical point about objects is that they can have parts. Think about our phone book example. Think about what parts there are to a phone book. Here are a few examples: the cover, pages, the blue pages (for government listings), and the phone company information (such as how to contact the phone company if your phone stops working). Each of these parts is its own object (a particular page might be an example of the class Page, or a range of pages might be an example of the class Pages). You might access the phone book by accessing a part of the book. For example,

```
myPhoneBook.Pages.TurnToTheNextPage
```

might take the set of pages and turn them to the next one, so if you are on page 57, for example, you will find yourself on page 59 (if the page is two-sided). Now the dot is serving two purposes. The first dot says that Pages is a part of the object myPhoneBook, and the second dot tells the computer to do the thing (run the method) TurnToTheNextPage, which is something that can be done to Pages.

While some parts of an object are other objects, some parts are properties. For example, a phone book has a color, a number of pages, and a thickness. So, for example, if I wanted to see how thick my phone book is, I might look at that property:

```
myPhoneBook.thickness
```

or I might want to add two thicknesses together to get something tall enough for my daughter to sit on and be able to reach the table:

```
myPhoneBook.thickness + myNeighborsPhoneBook.thickness
```

Finally, we turn to inheritance, and then you won't be an expert in OOP, but you will be able to play one on TV. We have been looking at the class PhoneBook. Well, isn't a phone book just a specific type of book? Therefore, we could think of a PhoneBook as a type of Book that inherits all the properties and methods from books. The object I am working with is still myPhoneBook, but it is not only a member of the class PhoneBook, it is (since PhoneBook is a subclass of Book) also a member of the class Book. Everything you can do with a book, in general, you can do with a phone book … and more. For example, you can turn pages in a book, look at the cover, weigh down papers, etc. You can also look up a phone number or find information about area codes in a phone book, but not in all books.

Now, with this basic understanding of objects, classes, and methods, you will be able to understand the basics of OOP when these terms come up.

Before leaving OOP, think about how it relates to PowerPoint. PowerPoint has many objects and classes. A typical PowerPoint presentation contains many slides. Slides! That's a class. As a class, `Slide` is the specific type of thing that you find in PowerPoint and `Slides` is the collection of all the individual slides in a presentation. The set of slides in your specific presentation is an object. That set of slides contains individual slides. A slide might contain many objects or shapes. Think about a slide with a text box, a piece of clip art, and a button. Perhaps these are shapes 1, 2, and 3 on the slide. They each have many properties, such as whether or not they are visible. Because a text box, a piece of clip art, and a button are all members of the class `Shape` and shapes may be visible or not, we can look at the `Visible` property of these objects. For example:

```
ActivePresentation.Slides(3).Shapes(2).Visible
```

This looks at the current PowerPoint presentation (`ActivePresentation`). That presentation contains slides (`ActivePresentation.Slides`). We want to look at the third slide (that's the `3` in parentheses), and we want to look at the second shape on that slide (`Shapes(2)`). Finally, that shape, like all shapes, can be visible or not, so we want to look at the `Visible` property. So what that small piece of code says is: Look at the `Visible` property of the second shape, which is one of the shapes, on the third slide, which is one of the slides, in the current PowerPoint presentation. It's a good thing we can use VBA because we would get pretty tired typing out long sentences like that.

If you don't understand the details of object-oriented programming languages, don't worry. Because you are learning to be a scripter, you will be able to pick it up as you go along. The more you understand, the easier it will be to change scripts to suit your purposes, but to start, you only need to type the scripts you see.

Conclusion

You now have a basic understanding of what VBA is and how it fits into the world of object-oriented programming languages. On a more practical level, you understand the parts of a PowerPoint presentation and some key parts of computer code (such as dots, parentheses, and quotes) that are used to access them. You are now ready to learn how to write VBA scripts.

Exercises to Try

- Pick an object that you use every day (cell phone, desk, watch, pen, remote control, etc.). List the classes of which this object is a member and what classes contain those classes (e.g., a specific pen is a member of the class pen, and pens are in the class writing instruments). Next list as many objects that are part of your object and write them in computerese (e.g., my pen has a cap so I might write `myPen.cap`). Next list as many properties of the object that you can and write them in computerese (e.g., `myPen.inkLevel`, `myPen.inkColor`). Finally, list the methods for this object (i.e., list what you can do with this object).
- Look at a simple PowerPoint presentation that you have created in the past. Using pencil and paper (or a drawing program or an organization chart in PowerPoint), try to draw a chart of all the parts of the presentation. Put the presentation at the top (you can call it `ActivePresentation`) and put the collection of slides below that. Under the collection of slides, put each of your individual slides (if you chose a big presentation, just pick the first three or four slides). Under each slide, put the various objects on the slide. See Figure 4.1 if you are having trouble getting started. Don't worry if you don't get all the objects; the purpose of this exercise is to begin to think about all the objects that you will be able to manipulate with VBA.

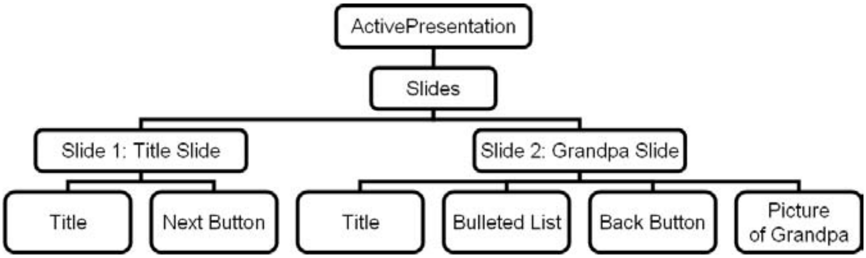


Figure 4.1. Example Chart of the Parts of a PowerPoint Presentation

- Pick one object from one slide and list as many properties as you can. The purpose of this exercise is not to get a detailed list of everything about a presentation or an individual object but to start thinking about how a presentation is organized and what properties objects might have for you to manipulate. Don't worry if you can't think of all the properties (objects contain properties about which you don’t even know) or even if your properties don’t match PowerPoint’s “official” properties. To get you started, think about a rectangle’s size, location, and color. You might also select the object within PowerPoint and try to see what properties you can change (click on the object to select it, go to the **Format tab** of the Ribbon or the last item in the **Format menu**). Anything you can change with traditional PowerPoint features you will be able to change with VBA.

5

Getting Started with VBA

Introduction

In previous chapters you learned some basic features of PowerPoint and what VBA is. This chapter shows you how to access the VBA Editor, how to write simple scripts in VBA, how to attach those scripts to buttons and objects, and how to protect your scripts with a password. When you have completed this chapter, you will know the mechanics of writing a script and using it in a PowerPoint presentation, and you will be ready to learn how to do some interesting things with VBA.

Vocabulary

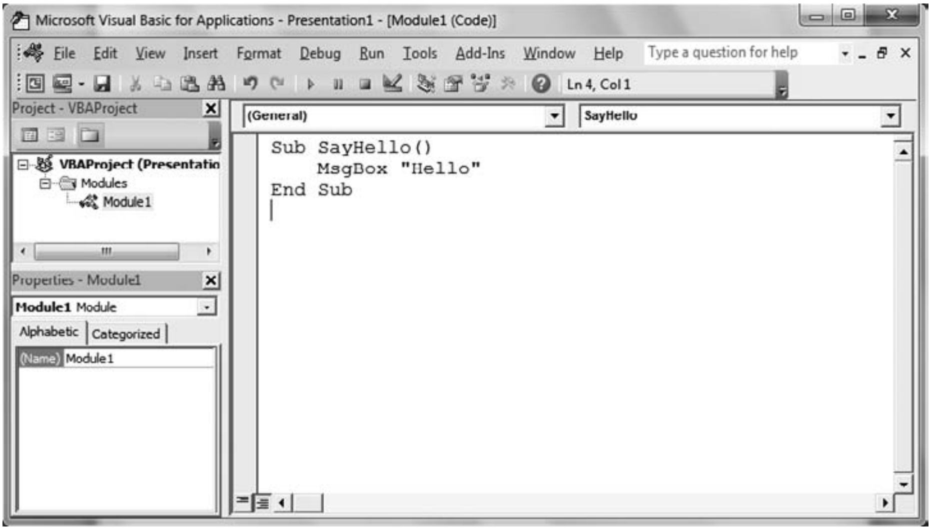
- Action settings
- Add text
- Button
- Macro
- Module
- `MsgBox`
- Password
- Visual Basic Editor

Accessing the VBA Editor

Once you start a PowerPoint project, you get into VBA by holding down the ALT key and hitting the F11 key (Option-F11 on a Macintosh). Alternatively, go to the **Developer tab** of the Ribbon and click on **Visual Basic** (PowerPoint 2007 and 2010) or **Editor** (PowerPoint 2011), or go to the **Tools menu**, choose **Macro**, and choose **Visual Basic Editor** from the fly-out menu (all other versions that support VBA). If you don't have the Developer tab, go back to Chapter 2 to review how to get it (see p. 15).

At this point, you should see two small windows on the left (the Project window and the Properties window) and a large blank area on the right of the screen. In 2011, there is no blank area so you can see your slides behind the VBA Editor. You also might not see either the Project window or the Properties window; you can get them back by choosing them from the **View menu**, but they are not too important right now. Another thing to notice is that the VBA Editor does not use the Ribbon, so you are back to using regular menus.

Choose **Module** from the **Insert menu**, and you will get a window in the blank area (see Figure 5.1). The window probably will be named “Module1.” This is where you will write your VBA procedures.



Module1 Module

(Name)	Module1

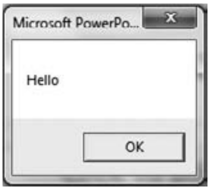
```
Sub SayHello()
    MsgBox "Hello"
End Sub
```

Figure 5.1. The VBA Editor

While we are here, let’s write one. Type the following:

```
Sub SayHello()
   MsgBox "Hello"
End Sub
```

Note that the computer will type the `End Sub` and the parentheses for you if you just hit Return or Enter on your keyboard after typing `Sub SayHello`. Now go to the **Run menu**, and select **Run Sub/UserForm**. You should get a message box that says Hello (see Figure 5.2).


Microsoft PowerPo...

Hello

Figure 5.2. `MsgBox` Says "Hello"

Congratulations! You have just written and executed your first VBA procedure. Click the OK button, and you can do some more.

What If It Didn't Work?

When you type code, it doesn't always work the first time (or the second time or the third time or . . .). Chapter 11 will give lots of great ideas for fixing what's wrong with your code; you might want to skip ahead to that chapter before you get too adventurous, but here's a quick tip. After typing some code that starts with `Sub` and ends with `End Sub`, click outside the procedure (before the `Sub` or after the `End Sub`) and watch for something in your code to turn red. Not all problems will turn red, but many will. If anything turns red, your code will not work. In fact, none of your code will work. You could have a thousand lines of perfect code and one little red line with a problem, and none of it will work at all. If something turned red, try to figure out what you did wrong or compare what you typed closely to the code in the book.

In this first example, the most common mistakes are: putting a space between `Say` and `Hello` on the first line (it should be one word) and getting the quotes wrong around `Hello` (they're regular, ordinary double quotes, and when you have an open quote, you need a close quote). Check everything carefully, and you'll be able to get this to work.

Help! I've Lost My Windows

You're adventurous. You like to play around. You were trying some things, and you lost your Project window in the VBA Editor. No problem. Keep playing around; it is the best way to learn. Oh yeah, and you want to get your Project window back. Simply go to the **View menu** and choose **Project Explorer**. What's that? You lost your module window, too? You *are* adventurous. Just double-click on **Module1** in the **Project Window**, as shown in Figure 5.3.

If you don't see Module1 in the Project window, but you do see Modules, you should have a + next to Modules; click on that and you should see Module1. If you don't see Modules, but you do see VBAProject, you should have a + next

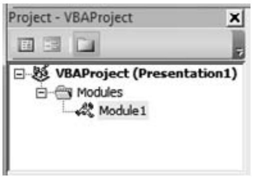


Figure 5.3. Project Window with Module1

to VBAProject; click on that to see Modules, click on the + next to Modules to see Module1, and double-click on Module1 to see the Module1 window. Finally, if you don't see Modules, and you don't see a + next to VBA Project, then you don't have a module (either you never inserted it, you deleted it, or you opened a new file that doesn't have one). Go to the **Insert menu** and choose **Module**, and you should be OK.

If you accidentally add more than one module, your modules will be numbered consecutively (Module1, Module2, Module3, …). While it is not a problem to have more than one module, you should avoid confusion by keeping all your scripts in the same module. Delete any extra modules by clicking on them in the **Project window** and choosing **Delete Module** from the **File menu**.

Be a Scripter: Change Things in Quotes

If your goal is to be a programmer, you should try to understand every last detail in every line of code in this book. If your goal is to be a scripter, you should have a basic understanding of what the code does, and you should try to understand as much of the details as you can. But the most important thing you can understand as a scripter is what you can change. One clue is that you can change most things that are in quotes. In this code, the word `Hello` is in quotes, and "Hello" popped up on the screen when you ran the procedure. If you want something else to pop up on the screen (like "Hi, Mom!" or "Good job" or "See ya later, alligator") then put that in the quotes in your code instead. Go ahead and try it.

Subroutine, Procedure, or Macro

What do we call the code that you just wrote (the stuff that starts with `Sub` and ends with `End Sub`)? The word `Sub` is short for subroutine, so that term would be correct. It is commonly referred to as a procedure, and this book will use that term most of the time. It could also be referred to as a macro, and you will see that term in the Developer tab of the Ribbon. In short, any of those terms is correct, and if you are OK about glossing over some complicated and unimportant (for our purposes) details, they are all equivalent.

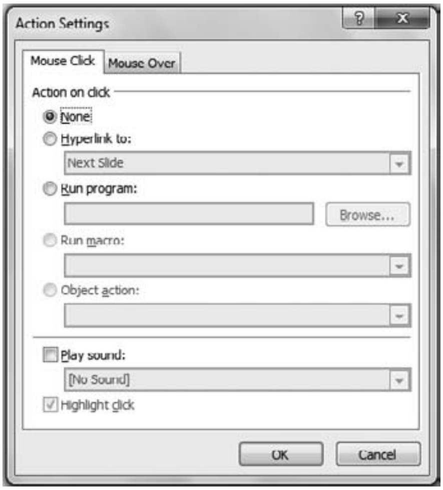
Tying Your VBA Script to a PowerPoint Button

Now that you have a procedure written, you will want to access it from within PowerPoint. You can do this by associating the procedure with a button (or any drawing shape that you want).

Go to PowerPoint (either choose it from the Task Bar or close the Visual Basic Editor by clicking on the X in the upper right-hand corner of the screen; on a Macintosh, choose **Close and Return to Microsoft PowerPoint** from the PowerPoint menu). Don't worry about losing your VBA scripts when you close the editor. Your VBA scripts are part of your PowerPoint presentation. When you save your presentation, your scripts will be saved with it. When you return to the editor, your scripts will still be there.

If you don't have a slide, create a blank slide. Don't worry about what kind of slide it is or what is on it. Add an action button to your slide (see Chapter 3 if you don't remember how to do that). The blank action button is a good choice because you can add text to it later.

As soon as you finish drawing the button, by dragging the mouse to form the button or just clicking where you want the button to appear on the slide, you will be presented with the Actions Settings dialogue box (see Figure 5.4). Choose **Run Macro**, and select **SayHello** (the name of the procedure you just wrote) as the macro to run. Click **OK**.



Action Settings

Mouse Click | Mouse Over

Action on click

● None

○ Hyperlink to:

Next Slide

○ Run program:

Browse...

○ Run macro:

○ Object action:

□ Play sound:

[No Sound]

☑ Highlight click

OK Cancel

Figure 5.4. Action Settings Dialogue Box

Buttons are only active in Slide Show View, so go to Slide Show View (choose **From Current Slide** from the Slide Show tab on the Ribbon or click on the **Slide Show icon** in the lower right or lower left corner of the screen). Now, click on your button, and you should get the same "Hello" (or whatever you changed it to) message you got earlier when running your procedure (see Figure 5.2, p. 63).

Now go back to Normal View (also known as Edit View) by hitting the Escape key on your keyboard. To finish your button, right-click (control-click on a Macintosh) on it and choose **Edit Text** or **Add Text** from the fly-out menu or select the button and just start typing. You can now add text to describe what your button does. This text will show up on the button, so users will know what they are clicking when they click your button. For this button, you might type "Greet Me."

Tying Your VBA Script to Any Object

You can tie your VBA script to any object you want, not just a button. Use the drawing tools to draw a shape (there are several interesting ones from which to choose in the **Shape** or **Shapes menu** of the **Home tab** of the Ribbon). Once you have drawn the shape, click on it to select it. Now choose **Action** from the **Insert tab** of the Ribbon (2007 and 2010) or **Action Settings** from the **Slide Show tab** of the Ribbon (2011) or **Action Settings** from the **Slide Show menu** (other versions). You will get the same dialogue box shown in Figure 5.4, and you can choose **Run Macro** and the **SayHello** macro, exactly as you did earlier. Now you can click on the drawn object just like you can click on the button.

This method works for any PowerPoint object, not just the ones you draw yourself. You can insert clip art and make it clickable by assigning Action Settings (just like you do to shapes you draw yourself) to run your script. You can insert pictures from other sources (such as the Web). You can even make text in your slide clickable by highlighting the text and following the previous steps.

What's in a Name?

We have now typed some sort of name related to what our button does three times. First, we named our procedure "SayHello." Whatever you type after the word `Sub` is the name of the procedure. We used that name later in the Action Settings dialogue box when we chose which procedure (we only have one so far, but we'll soon have a long list of procedures) to link to the button. Second, we typed the word `Hello` in quotes in our procedure so when the procedure is run, "Hello" pops up on the screen. Finally, we typed text into our button; I suggested "Greet Me," but you might have chosen something else. All three of these names—SayHello, Hello, and Greet Me—are related but different. The computer does not care if they are the same, similar, or totally different. We could have called our procedure `Hello`, kept `Hello` in the quotes, and put "Hello" as the text for the button. Conversely, we could have called our procedure `Mother`, put `Father` in the quotes, and put the text “Donuts for Sale” in the text for the button. That wouldn’t make any sense to us humans, but the computer wouldn’t care. The point is that, in this case, the consistent or inconsistent naming isn’t what makes it work; it’s the way we connect the procedure to the button.

Changing a Button

You might want to make three types of changes to your button: changing the PowerPoint attributes of a button, such as size, shape, or text; changing which script a button uses (including adding a script if the button isn’t tied to one); and changing what the script does that the button uses.

To change the attributes of a button, you would use traditional PowerPoint features. For example, you can change the text in the button by right-clicking on the button and choosing **Edit Text** from the fly-out menu. You can use any of the drawing tools to change the size, shape, color, etc., of the button.

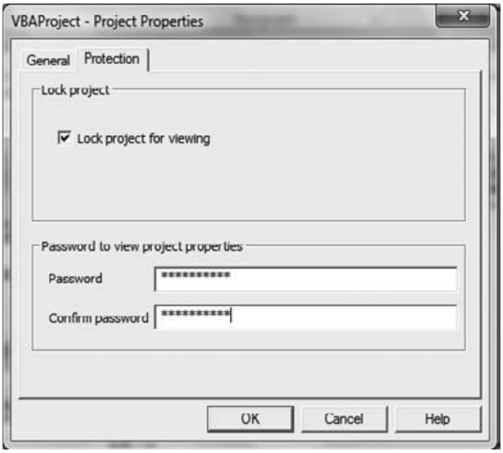
If you created your button and didn’t tie it to a procedure, you can select it and follow the instructions in “Tying Your VBA Script to Any Object” (see p. 66). Once in the Action Settings dialogue box (see Figure 5.4, p. 65), you can choose **Run Macro**. If you had associated your button with the wrong script, you can change which script the button runs in the Action Settings dialogue box. If you have more than one script, you can choose a different script from the pull-down menu under Run Macro. If you don’t want your button to run any script, click **None** in the Action Settings dialogue box.

⚠

Beware! If you have added text to your button, it is easy to accidentally link the text rather than the button. Generally, you want the entire button to activate your script, not just the text inside the button. You can tell that you have linked the text because PowerPoint will generally underline linked text. To ensure that you link the entire button, left click on the button to select it. Be sure that you do not have a cursor flashing in the text. If you do, left click anywhere on the button that is outside of the text. At this point you can set the Action Settings. Because PowerPoint allows you to link text separately from a button, you easily can get confused. If you have linked the text and you later check to see which script the button activates, your Action Settings dialog box will indicate “None.” Be careful to always link the entire button to avoid this confusion.

Securing Your VBA Script from Prying Eyes

In Chapter 3 we discussed Kiosk mode. By using Kiosk mode, you have put in place some security. Students will not be able to jump to any slide or skip a slide using the keyboard. However, you might put something in your VBA code that you don't want them to see. For example, if you are writing a quiz, your VBA code will include the answers so it can tell the students when they got the right and wrong answers. It is very easy to protect your VBA code with a password. While in the VBA Editor (where you edit the VBA code, not where you edit the PowerPoint slides), select **VBAProject Properties** . . . from the **Tools menu** and click on the **Protection tab** (see Figure 5.5).


VBAProject - Project Properties
General
Protection
Lock project
Password to view project properties
OK
Cancel
Help

☑ Lock project for viewing

Password ***********

Confirm password ***********

Figure 5.5. Setting a Password

Check the box that is labeled **Lock project for viewing**, type a password in the "Password" box, and type the same password in the "Confirm password" box. Now, whenever you want to view or edit the VBA code, you will be asked to type this password. Don't forget it, or you will not be able to access your own project.

Note that in newer versions of PowerPoint (beginning with 2002 for Windows and 2011 for Mac), you can set a password to access your file. If you choose to use this, beware of two things: (1) Anyone viewing or editing your presentation will need the password, and (2) anyone using a version of PowerPoint that doesn't have the password capability will not be able to view your presentation at all. This is different from the VBA password, which is available in all versions of PowerPoint that have VBA.

Conclusion

You now have control over navigation, you know how to lock your scripts with a password, and you know the basics of writing VBA scripts. You are ready to learn some more sophisticated scripts to promote interactivity.

Exercise to Try

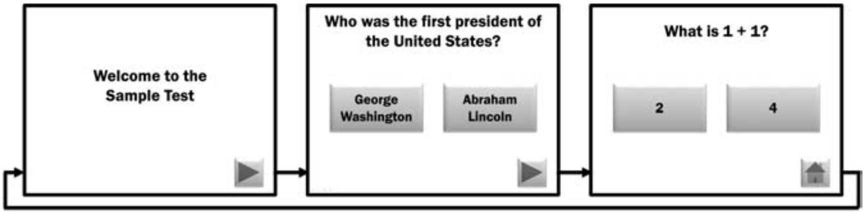

Welcome to the Sample Test
Who was the first president of the United States?
George Washington
Abraham Lincoln
What is 1 + 1?
2
4

Figure 5.6. Slides for a Simple Quiz in the Chapter 5 Exercise

- Create a small multiple-choice quiz in PowerPoint. Include a title slide and two question slides with two answers for each question: one correct and one incorrect. The questions should be in a text object or the title area of a title-only slide. The answers should be buttons.
- Use Add Text to add the text for the correct and incorrect answers to each question.
- Put a button on each slide to advance to the next slide.
- Put a button on the last slide to return to the title slide.
- Write a VBA script that is identical to `SayHello`, except name it `DoingWell`. Replace the text “Hello” with the text “Good job.”
- Write another VBA script that is identical to `SayHello`, except name it `DoingPoorly`. Replace the text “Hello” with the text “Try to do better next time.”
- Link your answer buttons to the `DoingWell` and `DoingPoorly` scripts.
- Put your presentation in Kiosk mode.
- Save your file and run it in Slide Show View.
- Add a password to protect the VBA from being seen.

6

Let's Get Scripting

Introduction

In Chapter 5 you learned how to access the VBA Editor and write a simple script. In this chapter you will begin to learn a few more basic scripts, including some scripts that allow you to get input from the user. In the process, you will learn a little bit about variables, which are used to store information, so you can use it when you give feedback. What good would it be to ask for the user's name if you don't use it as part of the feedback? You will get a preview of how to use some of the same scripts to get other kinds of input, such as answers to short-answer questions. Finally, in this chapter you will learn some details about running your scripts and associating them with buttons, including how to associate a button with more than one script.

Vocabulary

- Abstraction
- Ampersand (&)
- Declare
- `Dim`
- `InputBox`
- `Option Explicit`
- Scope
- `String`
- Underscore
- Variable
- Variable type

Variables and Getting Input

Earlier, you used a `MsgBox` to pop up a message on the screen. You can use a similar box to get input from your students. The only difference is that the new dialogue box will have a space for your students to type something. We'll start with something simple: asking for the student's name.

```
Sub YourName()
   userName = InputBox(Prompt:="Type your name",_
      Title:="Input Name")
End Sub
```

There are a few important things about this simple procedure. First, pay attention to the space and underscore at the end of the line. The last three characters on the second line are comma, space, and underscore. Without the space, the computer won't recognize the underscore that follows. The underscore is a special VBA character that tells VBA that what is on the next line is part of this line. Therefore, that entire line could have been written on one line without the underscore:

```
userName = InputBox(Prompt:="Type your name", Title:="Input Name")
```

The underscore simply allows you to divide long lines so you don't have to scroll to the right to see what is on each line. Feel free to write long lines on one line or divide them up among several lines as you see fit.

The next thing that is important about this small piece of code is that it uses a variable: `userName`. Since we don't do anything with the variable at this point, it is not terribly interesting, but we should note a few things about variables. Variables are places to store information. You can think of them as boxes in the computer's memory. Unlike algebraic variables, which represent one (or more than one) specific, unchanging value in an equation or series of equations, computer variables change values. That is, you can take something out of a box and put something else into the box. In algebra, the equation

```
x = x + 1
```

would not make any sense. In the computer, it makes perfect sense for two reasons:

1. While the variable `x` can only hold one value at a time, that value can change. At one time `x` might hold the value 7, and a moment later, `x` might hold the value 8.
2. The equal sign (=) is not a statement of equality. It is an assignment operator. It says, take the value on the right side and store it in the variable named on the left side. Therefore, the previous equation is not a statement of algebraic fact; it is an action. The part on the right (`x+1`) says, find what the value of `x` is and add one to it; the rest (`x =`) says, store that value in `x`. That is, if `x` was 7, it will now be 8. Using the box analogy, it says, look in the box we call "x," add one to what you find there, and put the result back in the box.

In the YourName procedure, we have used the variable userName. What we have said is: Take whatever the user types in the InputBox and put it into a variable called userName. Later, we will want to use the name (to say, for example, “Good job, Ella”) so we will get it out of the userName box when we are ready.

> Note that InputBox had some problems in PowerPoint 98 for the Macintosh. If you are still using that version, it is probably time to upgrade to something more modern (just not PowerPoint 2008 because it is the version that doesn’t have VBA at all).

Variable Declarations

> You can put the line Option Explicit as the first line in your module. This will prevent VBA from running any code that uses undeclared variables. For simple code, it might not matter too much if you declare your variables with a Dim statement, but the more complicated your code gets, the more likely this is to help you find problems. In the VBA Editor, you can go to the **Debug menu** and choose **Compile VBAProject** (see Chapter 12 for more details). This will catch certain kinds of errors. If you use Option Explicit, and you have any undeclared variables, the first undeclared variable will be highlighted and a message will pop up saying “Compile error: Variable not defined.” You will have to fix this before your code will run by either declaring the variable with a Dim statement or fixing the typo in your variable name.

For a variable to be useful, you often need to declare it. Although it is not necessary to declare all variables, it is good practice to do so. Declaring a variable does two things for you: It tells the computer which procedures are allowed to know about the variable (scope), and it tells the computer what kind of information the variable can hold (type). Declaring a variable is very easy. You do it with the Dim statement:

```
Dim userName
```

This line tells the computer that you want a box called userName to store some information (see Figure 6.1).

Figure 6.1. A Box Called `userName`

> ⚠ **Beware!** All `Dim` statements must go together at the top of your module (or right after the `Sub` line in a procedure). Never put a `Dim` statement between procedures. If you add a new procedure that needs a new variable, put the procedure where you want, and put the `Dim` statement for the variable with the other `Dim` statements at the beginning of the module.

The most important part about the `Dim` statement is where to put it. You have two choices: You can put it at the beginning of your procedure (right after the `Sub` statement) or at the beginning of your module (before any `Sub` statements). If you put it any place else, it will not work (that's not 100% true but close enough for your purposes). While programmers have lots of good reasons to put `Dim` statements in procedures, we are scripters, so for the purposes of this book, we will put most of our `Dim` statements at the beginning of the module. A `Dim` statement at the beginning of a module means that every procedure in the module can access that variable. That is, the scope of the variable is the entire module.

Alternatively, if you put the `Dim` statement at the beginning of the procedure, only that procedure can use the variable; that is, the scope of the variable is the procedure. For the `YourName` procedure, it would be pretty silly to create the `userName` variable so that only `YourName` could use it. If we did that, when we add a second procedure (such as the `DoingWell` procedure to tell the user how well he or she is doing), we won't be able to use the name typed by the user. That is, we would be stuck saying "Good job" instead of "Good job, Ada." Therefore, we want to add a `Dim` statement at the beginning of the module:

```
Dim userName

Sub YourName()
   userName = InputBox(Prompt:="Type your name",_
      Title:="Input Name")
End Sub
```

Just be sure that the Dim statement, along with all other Dim statements, is the first thing in your module (or right after Option Explicit) regardless of where in the module the YourName procedure is.

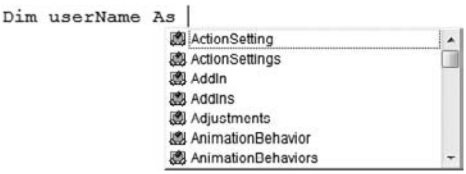
Variable Types

Variables are of certain types. That is, certain variables can hold certain kinds of information. If you don't tell the computer what kind of information the variable is holding in advance, it will figure it out. In the YourName procedure, the function InputBox always returns a variable of type String (a String is text), so VBA will figure out that userName is a String. However, it is a good idea to be explicit and tell the computer that you want userName to be of type String. You can do this by changing the earlier Dim statement to:

```
Dim userName As String
```

This Dim statement not only tells the computer that we want a variable called userName, but it also tells it what kind of information that variable can hold (using our box analogy, it tells it the size and shape of the box). In this case, our variable will hold a String (i.e., text) of up to 65,536 characters long.

Note that when you type a space after As, most versions of the VBA editor will use Intellisense™ to try to suggest things for you to type with a little box that pops up (see Figure 6.2).



```
Dim userName As
```

Figure 6.2. Variable Type Pop-Up Box with Intellisense

This box contains all the things that you can type now. Boxes like this will pop up frequently. If you know what you want to type, just ignore the box. If you're not sure what you want to type, scroll through the list to see the possibilities. If you find what you want on the list, you can either type it yourself or double-click on it in the box. When you double-click it will appear just as if you typed it, except that the computer will never spell it wrong.

For `Dim userName As`, you'll see all the types of things that `userName` can contain. There are about 300 of them, but there are just a few that you will care about now. Common types you will use are:

Table 6.1. Common Variable Types

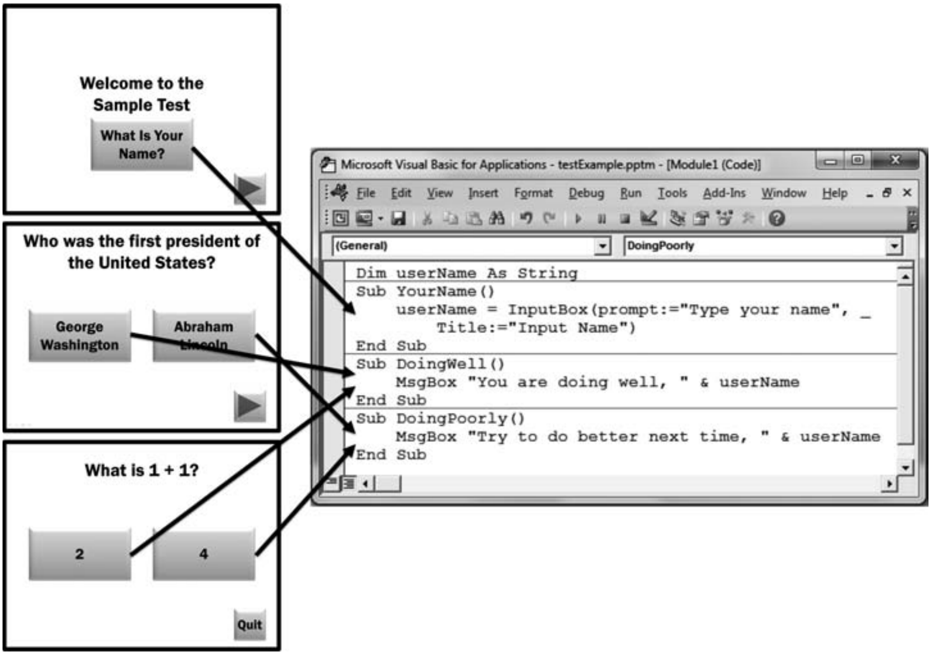
Boolean	True or False values
Integer	Any integer from –32,768 to 32,767
Long	Any integer from –2,147,483,648 to 2,147,483,647
Shape	Any PowerPoint shape (such as those things that can be drawn with the Draw tools)
Single	Non-integers (i.e., numbers with something after the decimal point, such as 3.14 and 98.6)
String	Any text up to 65,536 characters long
Object	Any object

Now, we are ready to put it all together with a `Dim` statement and two procedures:

```
Dim userName As String

Sub YourName()
   userName = InputBox(prompt:="Type your name",_
      Title:="Input Name")
End Sub

Sub DoingWell()
   MsgBox "You are doing well, " & userName
End Sub
```

The first procedure could be associated with a button on the first slide, and the second procedure could be associated with a button on a later slide. The result would be that when the first button was pressed, the student would be asked to "Type your name." If the student types "Ada," when the second button is pressed, a message would pop up on the screen saying, "You are doing well, Ada." The & (ampersand) character used in the `MsgBox` procedure is for concatenation of strings; i.e., the two strings "You are doing well," and whatever is stored in the variable `userName` (in this case "Ada") are joined together to make one string, "You are doing well, Ada," which is displayed in the box on the screen. Watch carefully for punctuation and spacing. If, for example, you don't put the space after the comma, then the `userName` will be right next to the comma without a space, as in: "You are doing well,Ada."

Of course this is a simple example, but it is really easy to turn it into a multiple-choice quiz with feedback that uses the student's name. Figure 6.3 shows the VBA script and slides for a short quiz. The arrows show which button should be connected to which procedure. The Next buttons and Quit button do not use VBA; they use traditional hyperlinks (see Chapter 3) for Next Slide and End Show. If you have forgotten how to tie your buttons to a procedure, look back in Chapter 5.


Welcome to the Sample Test
What Is Your Name?
Who was the first president of the United States?
George Washington
Abraham Lincoln
What is 1 + 1?
2
4
Quit
Microsoft Visual Basic for Applications - testExample.pptm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
DoingPoorly

```
Dim userName As String
Sub YourName()
    userName = InputBox(prompt:="Type your name", _
        Title:="Input Name")
End Sub
Sub DoingWell()
    MsgBox "You are doing well, " & userName
End Sub
Sub DoingPoorly()
    MsgBox "Try to do better next time, " & userName
End Sub
```

Figure 6.3. Simple Quiz

The YourName Procedure and Abstraction

One of the nice things about procedures is that they provide something called abstraction. Once you write a procedure and get it to work, you don't have to worry about it. You can think of the YourName procedure as YourName and stop worrying about the details of how it works. Another nice thing is that you can plug in different versions of a procedure without changing anything else in your code. Here are some example YourName procedures that you can use. Some of them will be explained later in the text, but you can still use them without understanding how they work; just replace the YourName procedure in any of your code with any of the other ones. Just remember, VBA doesn't like it when you have more than one procedure with the same name so either delete other versions or give them other names (such as YourName2).

1. The original YourName Procedure:

```
Sub YourName()
   userName = InputBox(prompt:="Type your name", _
      Title:="Input Name")
End Sub
```

2. A Simplified YourName Procedure:

```
Sub YourName()
   userName = InputBox("What is your name?")
End Sub
```

3. A Complex YourName Procedure that Forces the User to Type Something:

```
Sub YourName()
   Dim done As Boolean

   done = False
   While Not done
      userName = InputBox(prompt:="Type your name", _
         Title:="Input Name")
      If userName = "" Then
         done = False
      Else
         done = True
      End If
   Wend
End Sub
```

Force the Student to Type Something

Let's take a look at that last YourName procedure. It has a lot of complicated things going on. Don't worry if you can't understand all of them yet. Some of them, such as While loops and If blocks, will be explained in more detail in Chapter 9.

We have used a procedure to ask for a name, but some students will not want to type their names. We have ways of making them type. Let's expand our procedure to the third YourName example.

This example is a little more complicated than necessary (i.e., the same thing could have been done with four or five lines of code), but the complexity makes it easier to change. As a scripter, you always want to know what you can change. But first, let's try to understand what the procedure is doing. If you don't understand it all, don't worry; you can type the examples exactly as they are without understanding anything, and you can make small changes without understanding very much.

You should recognize the line beginning with `userName=`. That is the core of our old `YourName` procedure. The rest of the procedure is designed to figure out if the student has typed anything and, if not, ask the student again for a name.

To decide if the student has typed anything, we use a variable named `done`. When `done` is `True`, the user has typed something. When `done` is `False`, the user hasn't typed anything. You might notice that we declared this variable inside the procedure `YourName`. This means that only `YourName` will know about `done` (it would work just fine to declare `done` at the beginning of the module right before or after the `Dim` statement for `userName`). `done` is declared as `Boolean` because `Boolean` variables can be `True` or `False`, and we are either done or we are not done.

We start by setting the value of `done` to `False` (because the student surely has not typed a name before we even have asked). Next, we use a `While` loop (see Chapter 9 for more about `While` loops). This is a method of doing something over and over again as long as we want to keep going. We know we want to keep going if whatever comes after the word `While` is `True`. `Not False` is the same thing as `True`, so if `done` is `False`, `Not done` is `True`, and we keep going. In English, we keep going as long as we are not done.

How do we know when we are done? That is where the `If` statement comes in. We check to see what the student has typed (as stored in `userName`) and compare that to `""`(that is, two double quotes with nothing between them, also known as the empty string or nothing). If the student typed nothing (`If username = "" Then`), then we are not done, so we set `done` to `False` (`done = False`); that is, we put the value `False` in the variable named `done`. Otherwise (`Else`) the student must have typed something, so we are done, and we set `done` to `True` (`done = True`). The `Wend` just says that we are at the end of our `While` loop. Everything between `While` and `Wend` will be executed over and over again until we are done (in this case, until the student types something).

If the user types nothing, the `If` statement will set `done` to `False` and loop back up to the `While` statement. The `While` statement will see that we are not done, so we should keep going and execute the stuff between `While` and `Wend` again. It will ask for a name again. If the user types something, the `If` statement will set `done` to `True` and loop back up to the `While` statement. The `While` statement will see that we are done and move to whatever is after the `Wend` (we could do something else after the `Wend`, but we don't in this example).

Two things to note:

1. Students will be forced to type something, but that something could be anything: a single space, a dirty word, a period, etc.

2. Students will only be forced to type something if they click on the button associated with this script.

In later chapters, you'll learn how to check what was typed to make sure it is OK, as well as how to force the student to click on the button (don't worry; it doesn't involve physical force or shock therapy).

What Else? A Personal Response and a Short-Answer Question

Now that you have a basic script that responds to what the student typed, we can modify it just a bit to ask a question. We'll start with a very small change and build on it. First, let's just change the question from "Type your name" to "What color is the sky?"

```
Dim answer As String

Sub SkyQuestion()
   Dim done As Boolean

   done = False
   While Not done
      answer = InputBox(prompt:="What color is the sky?", _
         Title:="Question 1")
      If answer = "" Then
         done = False
      Else
         done = True
      End If
   Wend
End Sub
```

This is identical to the last `YourName` procedure, except we changed three things:

- We changed the name of the procedure to `SkyQuestion` instead of `YourName`; you can name procedures anything you want as long as they make sense to you (and they aren't the same as another procedure, a variable, or one of the reserved commands that VBA already knows about).
- We changed the name of the variable from `userName` to `answer`; you can name variables anything you want as long as they make sense to you (and they aren't the same as another procedure, a vari-

able, or one of the reserved commands that VBA already knows about).

- We changed the text in the `InputBox`; as a scripter, you always should look for text between quotes that you can change.

Also note that I included the `Dim` line to declare the `answer` variable, and that goes at the top of the module.

This is good, but it would be more helpful if we checked for a correct answer. Try this one:

```
Dim answer As String

Sub SkyQuestion()
   Dim done As Boolean

   done = False
   While Not done
      answer = InputBox(prompt:="What color is the sky?", _
         Title:="Question 1")
      If answer = "blue" Then
         done = True
      Else
         done = False
      End If
   Wend
End Sub
```

This changes three things:

- what the `If` is asking about
- what to do if the answer matches
- what to do if the answer doesn't match

If the answer typed is "blue" with the exact spelling and capitalization (see Chapter 8 to learn about how to accept alternative spellings and capitalization), then we'll set `done` to `True` and stop asking. If the answer typed is anything else, then we'll set `done` to `False` and loop around to ask again. Just beware that if the question is too hard for your students, this procedure will keep asking forever, and you know some of your students don't always know the answer to the easiest question. Chapter 8 will give you some options to stop looping after a few tries.

This is good, but we don't want to just stop when they get the right answer or keep asking when they get the wrong answer. Let's say something, too.

```
Dim answer As String

Sub SkyQuestion()
   Dim done As Boolean

   done = False
   While Not done
      answer = InputBox(prompt:="What color is the sky?", _
         Title:="Question 1")
      If answer = "blue" Then
         MsgBox "Good job!"
         done = True
      Else
         MsgBox "Try Again"
         done = False
      End If
   Wend
End Sub
```

Now, after the `If` line asks its question, we can do two things if the answer is correct or two things if the answer is incorrect. We either tell the student that the answer is correct and set `done` to `True` to stop looping or tell the student that the answer is incorrect and set `done` to `False` to keep looping.

You should be able to take this code and create as many short-answer questions as you like. On your slide, just connect each question procedure to a button, and be sure to give each question procedure a different name.

Think about the small differences between the `YourName` and `SkyQuestion` procedures. As a scripter, you should think about ways to change a script to make it do something different. Simply changing some text should be easy for you. Transforming `YourName` into `SkyQuestion` might be a bit difficult at this point, but with practice, you should be able to find more and more things that you can change.

Running Your Scripts

Before we write any more procedures, you should be reminded how to run procedures. There are three ways to run a procedure:

1. Select **Run Sub/UserForm** from the **Run menu** in the VBA Editor.
2. Choose **Macros** on the **Developer tab** of the Ribbon (2007, 2010, and 2011) or from the **Tools menu** and **Macro fly-out menu** (earlier versions). Select the name of the procedure you want to run, and click the **Run button**.
3. Associate your procedure with a button so it runs when the user clicks on it in Slide Show View.

4. Call the procedure from another procedure.

Generally, we won’t use method 1. Although it will work for some of the simple scripts we have written so far, it will not work for most of our scripts because we will design our scripts to be run in Slide Show View. When we choose **Run Sub/UserForm**, we are not in Slide Show View.

Method 2 has the same shortcomings as method 1, but there are some special procedures in Chapter 7 that will use that method.

Most of the time, we will use method 3: associate the procedure with a button. We did this at the beginning of Chapter 5. Remember that procedures aren’t magic; they have to be told to run. The best way to tell them to run is to associate them with a button and to click on that button in Slide Show View.

Sometimes we will want to use method 4. In this method, we write one script that includes the name of other scripts in it. Our button will be associated with the first script, but when that script is run, the other scripts will run as well. The next section describes this in more detail.

Calling a Procedure from Another Procedure

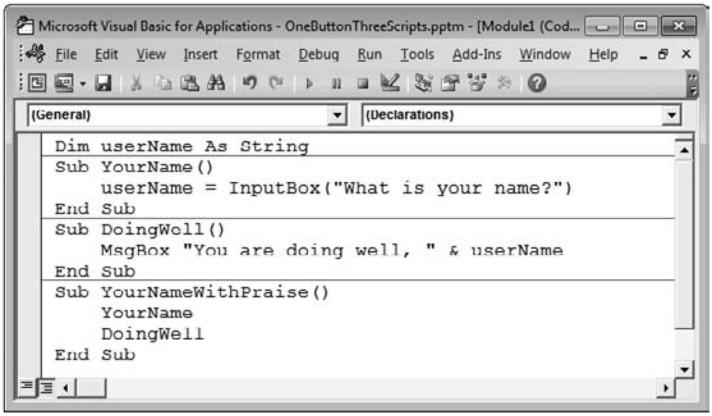
Not all procedures are tied directly to buttons. Many procedures are designed to do part of what you want a button to do. These procedures are called from other procedures. For example, let’s take two procedures we have already written: `YourName` and `DoingWell` (for simplicity we’ll use our simplest `YourName` procedure, but you could use any of the `YourName` procedures from this chapter):

```
Dim userName As String

Sub YourName()
   userName = InputBox("What is your name?")
End Sub

Sub DoingWell()
   MsgBox "You are doing well, " & userName
End Sub
```

You could associate a button with each of these procedures, so the users click on the first button to type their names and (probably at some later point) click on the other button to be told how well they are doing. What if we want to praise them right away, to encourage them right after they have typed a name? We could write another procedure that calls the two previous procedures:

```
Sub YourNameWithPraise()
   YourName
   DoingWell
End Sub
```

No buttons have to be associated with YourName or DoingWell. Create a button and associate it with YourNameWithPraise, and that is all you need. The button will activate YourNameWithPraise. When YourNameWithPraise starts to execute, it will see the first line: YourName. That signals it to run the YourName procedure. When it finishes the YourName procedure, it will run DoingWell. Your module will look like Figure 6.4.


Microsoft Visual Basic for Applications - OneButtonThreeScripts.pptm - [Module1 (Cod...
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
(Declarations)

```
Dim userName As String
Sub YourName()
    userName = InputBox("What is your name?")
End Sub
Sub DoingWell()
    MsgBox "You are doing well, " & userName
End Sub
Sub YourNameWithPraise()
    YourName
    DoingWell
End Sub
```

Figure 6.4. YourNameWithPraise **Calls** YourName **and** DoingWell

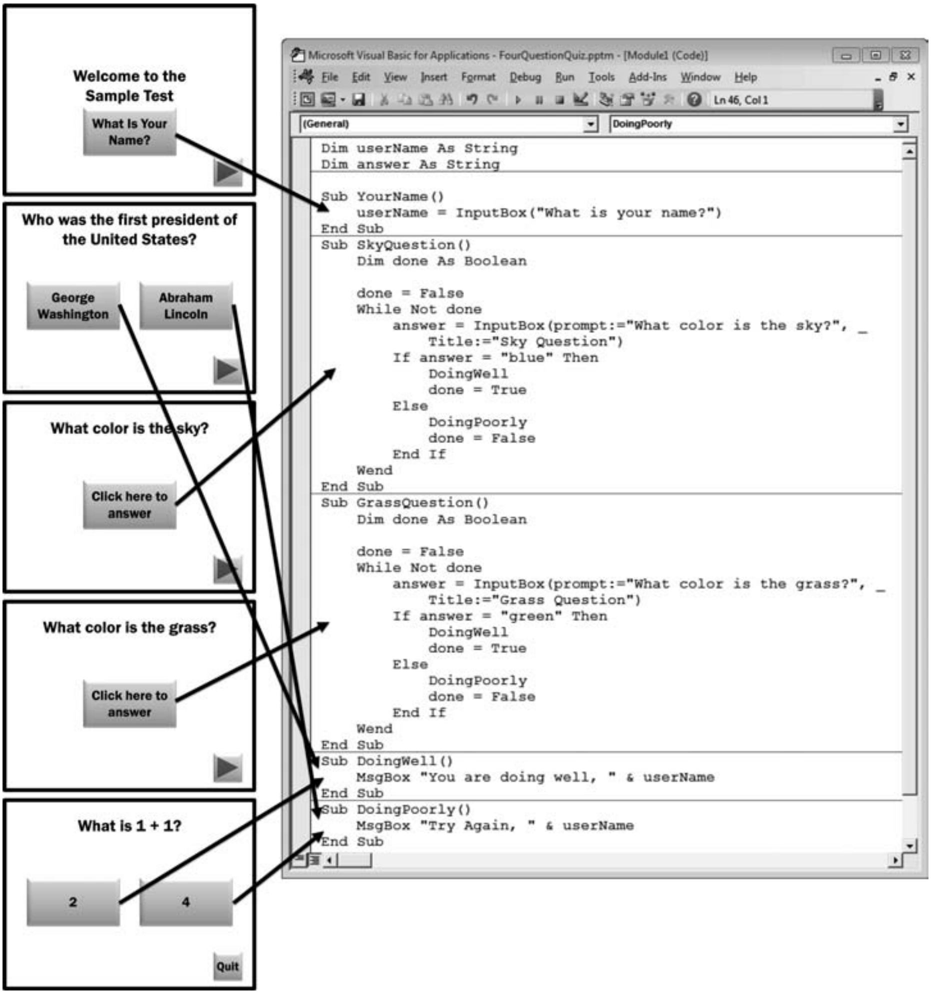
YourNameWithPraise is a good start, but you might find it more useful to use this technique to have DoingWell and DoingPoorly get called from your question procedure, SkyQuestion:

```
Sub SkyQuestion()
   Dim done As Boolean

   done = False
   While Not done
      answer = InputBox(prompt:="What color is the sky?", _
         Title:="Question 1")
      If answer = "blue" Then
         DoingWell
         done = True
      Else
         DoingPoorly
         done = False
      End If
   Wend
End Sub
```

This is another example of the power of abstraction. In this case, DoingWell and DoingPoorly are quite simple, but they could be very complex procedures that do or don't include the student's name or adjust the score or. . . . Once we figure out what we want them to do, we write them once and forget about it, just calling them by name to do as much or as little as they do.

Putting It Together: A Complete Quiz

Now, let's put it all together. Figure 6.5 shows a four-question quiz with two multiple-choice questions and two short-answer questions. Pay careful attention to the different procedures that are needed that need different names and the variables and where they are declared.


Welcome to the Sample Test
What Is Your Name?
Who was the first president of the United States?
George Washington
Abraham Lincoln
What color is the sky?
Click here to answer
What color is the grass?
Click here to answer
What is 1 + 1?
2
4
Quit
Microsoft Visual Basic for Applications - FourQuestionQuiz.pptm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Ln 46, Col 1
(General)
DoingPoorly

```
Dim userName As String
Dim answer As String

Sub YourName()
    userName = InputBox("What is your name?")
End Sub
Sub SkyQuestion()
    Dim done As Boolean

    done = False
    While Not done
        answer = InputBox(prompt:="What color is the sky?", _
            Title:="Sky Question")
        If answer = "blue" Then
            DoingWell
            done = True
        Else
            DoingPoorly
            done = False
        End If
    Wend
End Sub
Sub GrassQuestion()
    Dim done As Boolean

    done = False
    While Not done
        answer = InputBox(prompt:="What color is the grass?", _
            Title:="Grass Question")
        If answer = "green" Then
            DoingWell
            done = True
        Else
            DoingPoorly
            done = False
        End If
    Wend
End Sub
Sub DoingWell()
    MsgBox "You are doing well, " & userName
End Sub
Sub DoingPoorly()
    MsgBox "Try Again, " & userName
End Sub
```

Figure 6.5. Putting It Together: Four-Question Quiz

Conclusion

You now have learned a few basic scripts to interact with your students. You can get input and use it in feedback, either to include a student’s name in the feedback or to judge a short-answer question. In the next chapter you will expand your bag of VBA tricks, including ways to manipulate your PowerPoint slides, such as moving from slide to slide and hiding objects on your slides.

Exercises to Try

- If you completed the “Exercise to Try” in Chapter 5, edit your presentation to change the `DoingWell` and `DoingPoorly` scripts to include the student’s name. Be sure to add a button on the first slide to ask for the student’s name (using one of the `YourName` procedures in this chapter).
- Add two more slides to your quiz with short-answer questions. Put a single button on the slide that pops up the question. Use different questions than the ones in this chapter. Your result should resemble Figure 6.5.

7

A Scripting Bag of Tricks

Introduction

In Chapter 6 you began to expand your single trick, the `MsgBox`, into a small bag of tricks. On the way you learned some important lessons about variables, loops, and `If` statements. With this, you have the power to do some interesting things to your PowerPoint projects. You can create an interactive multimedia extravaganza as long as you only want it to be a little interactive. In this chapter, you'll expand your bag of tricks to include several interactive features, including navigation (i.e., moving around from slide to slide); hiding and showing PowerPoint objects; and changing text, font, size, and style in objects. You'll finish off the chapter with an example that ties some of the tricks together: You'll create a simple mystery with a clue sheet on which users can keep track of clues.

Vocabulary

- Argument
- Comment
- Constant
- Function
- Initialize
- Navigation
- Placeholder
- Procedure
- Property
- RGB
- TextRange
- `With` Block

Comments

Starting in this chapter, our examples are going to get a little more complicated. That makes this a good time to talk about comments. So far, any explanation of the VBA code has been placed in the text, but it might be helpful to have some explanation built right into the code. This will be useful for me to explain things to you, and it will be useful for you to explain things to yourself. Comments are good at the beginning of procedures, as a brief note at the end of a line, and as a note inside a procedure. In addition, comments are helpful to point out obvious things because what is obvious to me might not be obvious to you, and what is obvious to you now might not make as much sense when you look at it later. And comments are helpful to point out things that are not obvious. A line like

```
If answer = "" Then
```

obviously checks to see if the variable `answer` contains nothing, but it might be helpful to put a comment, such as “If the user didn’t type anything . . .”

```
If answer = "" Then 'If the user didn't type anything . . .
```

The comment starts with a single quote. This tells the computer to ignore everything else on the line. That is, comments are for people looking at VBA code, not for computers running VBA code; the computer ignores the comments. As in this example, the comment can appear at the end of a line, or it can appear on a line by itself or even on several lines each starting with a single quote:

```
'This procedure is our very first procedure.
'It puts a message on the user's screen that says "Hello."
Sub SayHello()
   MsgBox "Hello" 'This is the line that puts up the message.
End Sub
```

If you type this example into your VBA Editor, you will notice that the comments turn green. That will help you distinguish VBA code for the computer from comments for you.

The next section discusses how VBA can be used to move from one slide to another. This is an excellent place for a comment. The VBA command will tell you that you are moving to slide 3, for example, but it won’t tell you why. If, for example, slide 3 is your menu, a comment that says “Returning to the main menu” will help you understand what your script is supposed to do.

Navigation: Moving from Slide to Slide

The traditional features of PowerPoint that you have used include the ability of moving from one slide to another with action buttons or hypertext links.

If you hadn't seen this before, you learned about it in Chapter 3. In fact, almost anywhere you can go with VBA you can go with traditional PowerPoint hyperlinks. So why would you want to complicate your life by doing something with VBA that you already can do without it? This is a trick question. While you can link to the same places without VBA, your hyperlinks only work when you click a button or text, and linking will be the only thing that button or text does. With VBA, you can link and do something else, or you can link to different places depending upon the answer to a question (using something like what we did in Chapter 6 with the `YourName` procedure or the `SkyQuestion` procedure).

At the end of Chapter 6 you saw the procedure `YourNameWithPraise`. This procedure did two things: It asked for the student's name and it said, "You are doing well." Let's start with that and make one small addition:

```
Sub YourNameWithPraise()
   YourName
   DoingWell
   ActivePresentation.SlideShowWindow.View.Next
End Sub
```

The line that we added moves to the next slide. Don't worry how it does it; just remember that any time you want to use VBA to move to the next slide, you can insert that line into your procedure.

Imagine a title slide of your presentation. The only button on the slide would be associated with this procedure (of course, you would need the `YourName` and `DoingWell` procedures in your module, but only `YourNameWithPraise` would be tied directly to a button). When the user clicks on the button, `YourName` is called (the user is asked to type a name), `DoingWell` is called (the user is told by name, "You are doing well"), and the presentation automatically begins by moving to the next slide.

I lied. `ActivePresentation.SlideShowWindow.View.Next` doesn't really move to the next slide. Technically, it performs the next build or animation. However, if there are no animations on the slide or all the animations have already been done, it will move to the next slide. When you're working with VBA, you will probably have fewer animations so 99% of the time `ActivePresentation.SlideShowWindow.View.Next` will move you to the next slide.

Of course, you don't always want to go to the next slide. To move around within your presentation, you can use any of the following in Table 7.1.

Table 7.1. Navigation Commands in VBA

`ActivePresentation.SlideShowWindow.View.GotoSlide 3`	Go to slide 3
`ActivePresentation.SlideShowWindow.View.GotoSlide 4`	Go to slide 4
`ActivePresentation.SlideShowWindow.View.Next`	Go to the next slide
`ActivePresentation.SlideShowWindow.View.Previous`	Go to the previous slide
`ActivePresentation.SlideShowWindow.View.First`	Go to the first slide
`ActivePresentation.SlideShowWindow.View.Last`	Go to the last slide
`ActivePresentation.SlideShowWindow.View.Exit`	Exit the slideshow

With the first statement, you can go to any slide in the presentation. Simply replace “3” with the number of any other slide. The only difficulty is that if you change the order of your slides, insert a new slide, or delete a slide, you will have to change the number. That is why later we will learn how to use names instead of numbers (see “What’s in a Name? Finding and Changing Object and Slide Names” later in this chapter, pp. 98–102).

The ability to move around can be very powerful, particularly when the slide to which you want to go is based on something the user types or does. The next section reveals some secrets of `MsgBox` and ends with an example that moves to a particular slide based on which button is pressed in the `MsgBox`.

The Secrets of the `MsgBox`

Until now, we have used the `MsgBox` command to pop messages up on the screen. That is its main purpose. However, it can do more. Although it can’t let the user type a message (use `InputBox` for that), `MsgBox` can display a few different combinations of buttons. If you don’t tell it which button(s) to use, it just has an OK button. Table 7.2 shows the different button combinations you

Table 7.2. MsgBox Parameters

Button	Constant
OK	`vbOK`
OK, Cancel	`vbOKCancel`
Abort, Retry, Ignore	`vbAbortRetryIgnore`
Yes, No, Cancel	`vbYesNoCancel`
Yes, No	`vbYesNo`
Retry, Cancel	`vbRetryCancel`

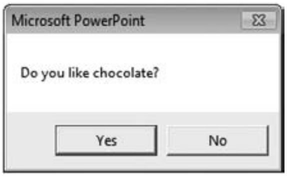
can use along with the secret word, which we'll call a "constant," to access that combination. I'll explain the secret word in a moment.

We can now use a `MsgBox` to ask a simple question. We don't have a lot of choices for the answers (just the limited choices in the table), but at least we can ask a yes/no question with a `MsgBox`. For anything more complicated, just use action buttons on a slide and skip the `MsgBox`.

To put more buttons in a `MsgBox`, we need to do two things: add a second parameter to the `MsgBox` command (that's where the secret word comes in) and store the answer in a variable. Because the user can press one of two or three buttons, we need a way to keep track of which button was pressed. For example:

```
whichButton = MsgBox("Do you like chocolate?", vbYesNo)
```

The variable `whichButton` will store information about which button was pressed, and the second parameter to `MsgBox` (after the message that is to appear and the comma) is the constant that tells `MsgBox` which buttons to use. Figure 7.1 shows the `MsgBox`.



Do you like chocolate?

Figure 7.1. MsgBox with Yes and No Buttons

The secret words are called constants because they represent constant values (unlike variables, which can change value). In this case, the constants are mnemonics for numbers. For example, `vbYesNo` is really the number 4. Wherever you see the constant `vbYesNo`, you could type 4 instead. However, it might be easier to remember that `vbYesNo` means "I want Yes and No buttons" than remembering what 4 means in a `MsgBox` command. You can make your own constants, but we'll just use the ones that come with VBA; these usually start with the letters `vb` (for Visual Basic) or `mso` (for Microsoft Office), so if you ever see something that starts with `vb` or `mso`, it is probably a constant.

VBA comes with hundreds of constants that can be used with different commands, and it comes with a few more for the `MsgBox` command. The most important ones are values returned by `MsgBox` depending on which button was pressed. The following are the possible values: `vbOK`, `vbCancel`, `vbAbort`, `vbRetry`, `vbIgnore`, `vbYes`, and `vbNo`. For example, if the user clicks the Yes button, `MsgBox` returns `vbYes`. We might want to do something based on the button pressed. For example:

```
'Ask if you like chocolate. Give an appropriate response.
Sub Chocolate()
   Dim chocolateAnswer

   chocolateAnswer = MsgBox ("Do you like chocolate?", vbYesNo)
   If chocolateAnswer = vbYes Then 'The user likes chocolate.
        MsgBox "I like chocolate, too."
   Else 'The user does not like chocolate.
        MsgBox "Vanilla is a good choice."
   End If
End Sub
```

Here is an example for a commonly used feature: a quit button. Sometimes users accidentally choose quit (by clicking on a button that calls a procedure with `ActivePresentation.SlideShowWindow.View.Exit`). To prevent quitting your presentation by accident, you might want to ask if the user really wants to quit. Associate the following procedure with your quit button:

```
'Ask if you are sure you want to quit. If the answer is Yes,
'exit the presentation. If the answer is No, go to the next slide.
Sub QuitOK()
   'result is a variable to keep track of which button is clicked.
   Dim result

   'MsgBox returns (will set the variable result to) vbYes if the
   'Yes button is clicked and vbNo if the No button is clicked.
   result = MsgBox("Are you sure you want to quit", vbYesNo)
   If result = vbYes Then 'Was the Yes button clicked?
        ActivePresentation.SlideShowWindow.View.Exit 'Quit
   Else 'Since Yes wasn't clicked, it must be No
        ActivePresentation.SlideShowWindow.View.Next 'Next slide
   End If
End Sub
```

With the additional power of `MsgBox`, you have another tool to do something based on the answers to simple questions. By combining this with navigational commands from the previous section, you can let the user go anywhere in your presentation based on the answers to questions. But moving from slide to slide isn't the only response. You might want to stay on the same slide and have something magical happen. Later in this chapter, you will learn how to make objects appear and disappear.

Procedures, Functions, and Parentheses

What do you notice that is different about the `MsgBox` commands in the last section? It's not just that there are more parameters (also known as arguments).

You might notice the parentheses. Sometimes we use them, and sometimes we don't. If you're ever in doubt, you might just want to use them, but I'll explain here what they're doing. It has to do with the difference between a procedure and a function. A function returns a value and expects you to do something with it. A procedure just does something without returning a value. A function requires parentheses around its arguments. A procedure does not, but it won't complain if they are there.

> There is a subtle difference between the term *parameter* and the term *argument*, but it is not important to you as a scripter.

What does it mean to return a value? After it does something, a function has some kind of result that it gives back to you. Imagine adding 5 to something. I can give you 6, and you can say 11 to me. You have just acted as a function because you have returned a value. When you "say" 11, you expect me to do something with that. In fact, the computer is a bit of a stickler about that; it requires you to have someplace to put the value that it returns. Often you will put the result in a variable. We won't write a lot of functions in this book—we'll mostly use the pre-made ones that come with VBA—but here is an `Add5` function:

```
Function Add5(myNum As Long) As Long
   Add5 = myNum + 5
End Function
```

It takes an argument that it calls `myNum` and returns a value. Both the argument and the value returned are of type `Long,` meaning that they can be integers up to a very large value. If you want to use `Add5,` you'll have to put the argument in parentheses and do something with the value, such as one of the following:

```
   'Take 6, add 5 to it, and put it in theAnswer
   theAnswer = Add5(6)

   'Take 22, add 5 to it, and pop up a message with the answer
   MsgBox Add5(22)

   'Ask for a number with InputBox, add 5 to it,
   'and pop up a message with the answer
   MsgBox Add5(InputBox("What shall we add 5 to today?"))
```

We've seen `MsgBox` used as a procedure, where it just pops up a message and doesn't return a value; `MsgBox` used as a function, where it pops up a message and returns a value based on what button the user clicks; and InputBox, which can only be used as a function because it always returns whatever the user types. Most commands can only be used as a procedure or a function, not a procedure sometimes and a function at other times. MsgBox is unusual because it can go both ways. Remember that functions need parentheses around their arguments and procedures do not. When you look at examples in this book and elsewhere, you can pay attention to the parentheses to know if the command is going to return a value or not.

Hiding and Showing PowerPoint Objects

In PowerPoint, every object that you see on the screen (text boxes, buttons, pictures, etc.) has several properties that can be controlled by VBA. These might include the height and width of the object, the text displayed in the object, the color of the object, etc. Another property is whether or not the object is visible. If you want to be able to see the object, you can set its Visible property to True (note that VBA has a value that is msoTrue; this is the same as True for all your purposes, so don't worry if the VBA Editor suggests msoTrue; you can use msoTrue or True and it will work). If you want to hide the object, you set its Visible property to False (or msoFalse). For example, if you want to hide the fifth object on the second slide (see "Referencing Objects by Number" p. 97 if you don't know which is the fifth object), you could use the following line:

```
ActivePresentation.Slides(2).Shapes(5).Visible = False
```

Change False to True, and you show the object once again:

```
ActivePresentation.Slides(2).Shapes(5).Visible = True
```

For example, you might want a star to appear on a slide when a user gets the correct answer. To do this, create the star where you want it (using regular PowerPoint drawing tools) and even add text, such as "Good job!" (see "Manipulating Text in Objects" p. 109 for more about changing the text on the fly to include the current score or the user's name). Before this can work effectively, we'll need to set up the presentation before the user gets to the slide with the star. This will require us to initialize the presentation.

PowerPoint 2007 sometimes has a serious problem with hiding and showing objects. There are workarounds, but they are not quite as easy as simply changing .Visible to True or False.

The easiest workaround is to move the shape off the viewable area of the slide by changing the .Top property to something like -3000:

```
ActivePresentation.Slides(2).Shapes(5).Top = -3000
```

Then to make it visible, use the same code, except change `-3000` to something on the slide (preferably wherever it was originally), such as:

```
ActivePresentation.Slides(2).Shapes(5).Top = 150
```

PowerPoint 2004 also has a less serious problem with hiding and showing objects. If you are using that version, just stick the following bit of code after every line where you change the value of `.Visible`:

```
ActivePresentation.SlideShowWindow.View.GotoSlide _
   ActivePresentation.SlideShowWindow.View.Slide.SlideIndex
```

This simply refreshes the slide, which PowerPoint 2004 didn’t always do automatically.

You can tell that one of these issues is your problem if you try to hide or show a shape using `.Visible = False` or `.Visible = True,` and the shape doesn’t hide or show, but it does hide or show when you exit Slide Show View. If that happens, use one of these workarounds to get around the bug that is not your fault.

Let’s Get Started: Initializing Your Presentation

Up to this point, the user could go to any slide and not worry how it looked or even what was in any of the variables except possibly `userName`. As our presentations get more complicated, we will need to keep track of many different things. It will be important that everything in the presentation starts out how you want it. You don’t want the user to go to a slide that has a star showing before choosing the right answer that is supposed to show the star. If you’re keeping score, you want to be sure that the score starts at 0.

These kinds of things should be set up at the beginning of the presentation. One of the best ways to do this is with a button on the title slide. If it is the only button on that slide and you are in Kiosk mode, you know the user has to click that button to continue. All that the user might see is that the button goes to the next slide or asks for a name, but behind the scenes, your procedure is cleaning up everything (making the beds, dusting the furniture, setting up variables, hiding the toys and stars—all the things that you do before company comes).

In the hide and show example from the previous section, the one thing we want to do is hide our star. We will use a procedure called `Initialize` to do this (you could call it anything you want, like `Housekeeper`, `Maid`, or `Mom`). Let’s imagine that you have two slides (slides 2 and 3) that will show stars when the correct answer is chosen. If the stars are the fourth object on the slides, your Initialize procedure might look something like this:

```
Sub Initialize()
   ActivePresentation.Slides(2).Shapes(4).Visible = False
   ActivePresentation.Slides(3).Shapes(4).Visible = False
End Sub
```

You could add something to this procedure to move to the next slide, or you can do all your initializing from this procedure and have another procedure take care of other stuff. So let's add a GetStarted procedure to do the other stuff as well as call the procedure Initialize.

```
Sub GetStarted()
   Initialize 'Hide the stars
   YourName 'Ask for the name
   ActivePresentation.SlideShowWindow.View.Next 'Go to the next slide
End Sub
```

This procedure will be linked to the button on the title slide. As the comments indicate, it will use the Initialize procedure to hide the stars, it will use the YourName procedure to ask for a name, and it will use ActivePresentation.SlideShowWindow.View.Next to go to the next slide. As always, because this procedure calls the YourName procedure and the Initialize procedure, these procedures must be included in your module along with the declaration (Dim statement) for the userName variable.

GetStarted is the only procedure that needs to be tied to a button. Initialize and YourName don't ever need to be tied to a button because they are called from GetStarted. Be sure you have one button on your first slide, and be sure it is tied to GetStarted.

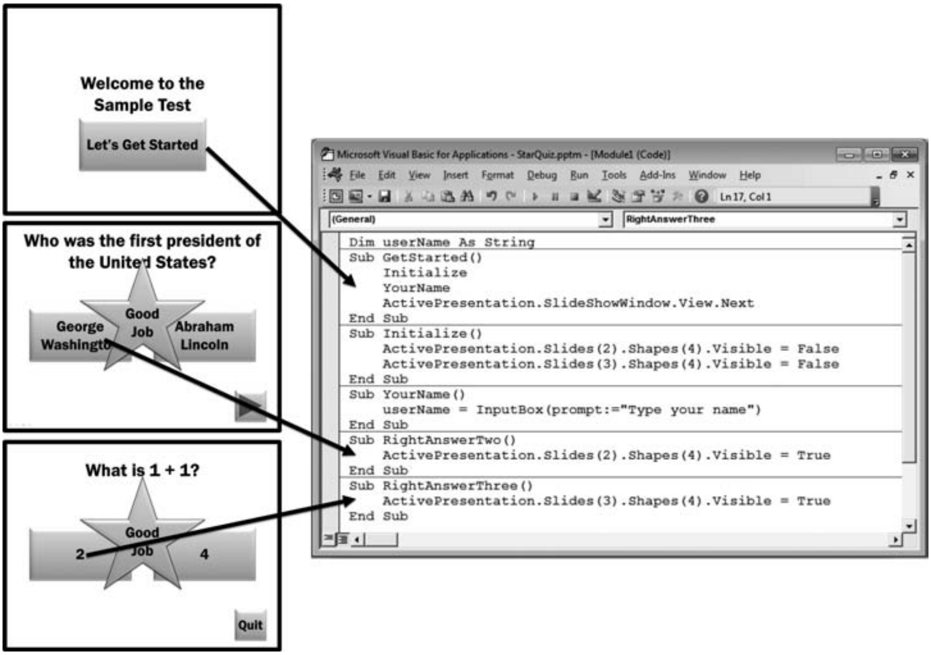
As you keep track of more things, you will set up more things in the Initialize procedure. This will include more objects that might be hidden or shown and variables, like ones to store the number of correct and incorrect answers that need to be given initial values. You'll see more about this in Chapter 8 when we start keeping score.

Finally, tying this all together, slides 2 and 3 will need buttons to show the stars. These buttons might be the right answer buttons on those slides. For example, the right answer on slide 2 might be linked to

```
Sub RightAnswerTwo
   ActivePresentation.Slides(2).Shapes(4).Visible = True
End Sub
```

Other things could happen in the RightAnswerTwo procedure, such as adding one to the number of correct answers or putting up a MsgBox, but until we get to Chapter 8, a star with the text “Good job” will be enough.

Figure 7.2 shows the VBA script and slides for this example. The arrows show which button should be connected to which procedure. The stars are showing in the figure, but they will be hidden in the GetStarted procedure and shown when the correct answer is chosen.


Welcome to the Sample Test
Let's Get Started
Who was the first president of the United States?
George Washington
Good Job
Abraham Lincoln
What is 1 + 1?
2
Good Job
4
Quit
Microsoft Visual Basic for Applications - StarQuiz.pptm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Ln 17, Col 1
(General)
RightAnswerThree

```
Dim userName As String
Sub GetStarted()
    Initialize
    YourName
    ActivePresentation.SlideShowWindow.View.Next
End Sub
Sub Initialize()
    ActivePresentation.Slides(2).Shapes(4).Visible = False
    ActivePresentation.Slides(3).Shapes(4).Visible = False
End Sub
Sub YourName()
    userName = InputBox(prompt:="Type your name")
End Sub
Sub RightAnswerTwo()
    ActivePresentation.Slides(2).Shapes(4).Visible = True
End Sub
Sub RightAnswerThree()
    ActivePresentation.Slides(3).Shapes(4).Visible = True
End Sub
```

Figure 7.2. Simple Quiz Showing Stars for Correct Answers

Referencing Objects by Number

In the previous example, we hid and showed shape number 4 on slide number 2. You might be asking, “How do I know what the shape number is? I want to hide that star, and I don’t know what number it is.” The number of an object generally is the order in which it was added to a slide. If you start with a blank slide and add a text box, a rectangle, and a button (in that order), the text box will be shape number 1, the rectangle will be shape number 2, and the button will be shape number 3. If you start with a slide that is not blank, the existing shapes will count. So, if you start with a bulleted list slide (known as a “Title and Text” slide or “Title and Content” slide in more recent versions of PowerPoint) and add the text box, rectangle, and button,

- the slide title will be shape number 1,
- the bulleted list text area will be shape number 2,

- the text box you added will be shape number 3,
- the rectangle will be shape number 4, and
- the button will be shape number 5.

This is fine, but most of us don't have superhuman memories that can remember what order shapes were added. For PowerPoint 2007 and 2010, choose **Selection Pane** from the **Selection button** on the **Home tab** of the Ribbon. The shapes will be listed in reverse order so you can count up from the bottom. Ignore the numbers after the shapes on the selection pane. These are the numbers from when the shape was originally added to the slide, but they might or might not be the right shape numbers.

In PowerPoint 2011, select any object. On the **Format tab** of the Ribbon, choose **Reorder Objects** from the **Arrange button**. You will see a three-dimensional representation of your slides with one shape per slide. Do not use the numbers shown here as they are in reverse order. Instead, count from the back of the stack of slides until you reach the object for which you want the number.

In earlier versions of PowerPoint, there are ways to find the object numbers, but for all versions, it is easier to use names. If you can't find the object numbers, just use names, which will be covered in the next section.

The difficulty with referencing objects by number is that numbers change. This can happen if you delete an object from your slide or change the drawing order of your objects (using **Bring Forward** or **Send Backward**, for example, from the **Arrange button** of the **Home tab** of the Ribbon in 2007, 2010, and 2011). When you delete an object from a slide, all the higher numbered objects change. For example, in our earlier slide with only the text object, the rectangle, and the button, if we delete the text object, the rectangle becomes object number 1, and the button becomes object number 2. If you had written a script to do something to the rectangle, referencing the rectangle as object 2, your script would not work. That is why it is better to reference objects by name; names do not change unless you change them.

What's in a Name? Finding and Changing Object and Slide Names

Every slide has a name, and every shape on a slide has a name. Anything you can do with a slide's or shape's number you can do with its name. Names are better than numbers because names of slides and shapes don't change unless you change them. Sometimes it is easy to refer to a slide or a shape by number. Slide numbers are obvious (the first slide is slide 1, the second slide is slide 2, etc.), and shapes are numbered in the order they were added to a slide. However, things change. Shapes get deleted (messing up the numbers for all later shapes), slides get moved, etc. You can't count on numbers staying the same. To get started, it is a little bit harder to use names because there are a few extra things to learn, but very quickly names will be much easier and much more stable than numbers; names never change.

The most important thing you need to know is that two shapes on the same slide can't have the same name, and two slides can't have the same name. If things have the same name, PowerPoint will get confused, and your VBA won't work.

The other thing that you need to know is that this section contains special procedures that violate some of the rules for procedures in this book. Specifically, we are going to put them in a separate module, and we are going to run them in Normal View, not Slide Show View.

Shape Names

In PowerPoint 2007 and 2010, it is easy to find the names of shapes on a slide using the Selection Pane (just like we found the numbers of shapes). On the **Home tab** of the Ribbon, go to the **Select button** and choose **Selection Pane** from the menu. The shapes in the Selection Pane are not only listed in reverse order of their numbers, they are also listed by name. Just be sure to note that many shape names include spaces. As an added bonus, you can also use the Selection Pane to change the name of shapes so you aren't stuck with weird names like "Rectangle 3" and "Action Button: Custom 5." Just beware that the Selection Pane doesn't warn you if you name two shapes the same thing on the same slide even though that will cause you problems later.

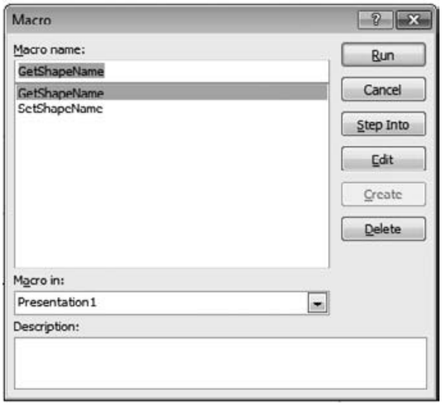
In other versions of PowerPoint (including 2011 for the Mac), the Selection Pane doesn't exist, so you will have to use VBA to name shapes and to find their names.

We'll start with two procedures for shapes:

```
Sub GetShapeName()
   MsgBox ActiveWindow.Selection.ShapeRange.Name
End Sub

Sub SetShapeName()
   Dim shapeName As String

   shapeName = InputBox(prompt:="Type a name for the shape")
   ActiveWindow.Selection.ShapeRange.Name = shapeName
End Sub
```

Because these procedures are special "utility" procedures and because they run in Normal View, I recommend putting them in a separate module. Within the VBA Editor, you can choose **Module** from the **Insert menu** again to get a module named "Module 2." To get back to Module 1, you can just double-click on it in the Project Explorer window. Put these procedures in Module 2.

To run these procedures, you must first select one and only one shape on a slide. For example, if you drew a picture of a star on your slide, click on it to select it. Now, you can hit option-F8 (any Windows version) or alt-F8 (any Mac version) on your keyboard, or choose **Macros** on the **Developer tab** of the Ribbon (2007, 2010, and 2011) or from the **Tools menu** and **Macro fly-out menu** (earlier versions). Select the name of the procedure you want to run, and click the **Run button** (see Figure 7.3). `GetShapeName` will pop up a box with the name of the selected shape. `SetShapeName` will ask you to type a new name for the shape.



Macro

Macro name: GetShapeName

GetShapeName
SetShapeName

Macro in: Presentation1

Description:

Figure 7.3. Running a Macro in Normal View

If you try to run either of these procedures without having one shape selected, you will get an error message. If you try to give a shape the same name as another shape on that slide, you will also get an error message, so be sure to give each shape on a slide a different name. If you don't type anything for the name of the shape, you will get an error message. It's possible to put lots of special code to check for all these possible errors, but your students won't use these procedures (you'll never tie them to a button) so it's OK if you get a cryptic error message. You'll just know that you did one of these things wrong.

Slide Names

Just as shape numbers can change, slide numbers can change as well. If you are trying to go to a particular slide and you use a slide number, you might have a problem if you delete or insert slides before that slide. Slide names never change unless you change them. When a slide is created, it is assigned a name (Slide1, Slide2, Slide3, etc.). These names are assigned in the order the slide is inserted, not the order in which the slide is within the presentation. For example, if you create a slide, it will be named "Slide1." If you create another slide, it will be named "Slide2." If you create a third slide between "Slide1" and "Slide2," it will be the second slide in the presentation, but it will be named "Slide3."

If you move slides around a lot, you will have a hard time remembering their names. Unfortunately, no versions of PowerPoint offer an easy way to see slide names and change them (like the Selection Pane for shape names). Use `GetSlideName` and `SetSlideName` to find out the name of the current slide and to change the name of the current slide:

```
Sub GetSlideName()
   MsgBox ActiveWindow.View.Slide.Name
End Sub

Sub SetSlideName()
   Dim slideName As String

   slideName = InputBox(prompt:="Type a name for the slide")
   ActiveWindow.View.Slide.Name = slideName
End Sub
```

These procedures are very similar to `GetShapeName` and `SetShapeName`. They also run in Normal View of PowerPoint, so they must be run as previously described (see Figure 7.3).

Using Names

Names of shapes and slides are easy to use. Whenever you might have typed the number of a shape or slide, you can use its name in quotes instead. For example, you might have a menu slide that you named "Menu" (don't type the quotes when you are setting the name). You might have a quiz button on the slide that you named "QuizButton" (don't type the quotes when you are setting this name either). If the menu is slide 2, and the quiz button is shape 7, you could hide the quiz button with the following line:

```
ActivePresentation.Slides(2).Shapes(7).Visible = False
```

If you want to use names, and I recommend using names, the code is the same, except that the numbers are replaced by the names you gave the slide and the button:

```
ActivePresentation.Slides("Menu").Shapes("QuizButton").Visible = False
```

It is slightly more difficult to jump to a named slide. `ActivePresentation.SlideShowWindow.View.GotoSlide` requires a number; that is, it cannot use the name of the slide in place of the number. Fortunately, we can get the slide number by using the name. To jump to the slide named "Menu," we could use the following two lines:

```
ActivePresentation.SlideShowWindow.View.GotoSlide _
   ActivePresentation.Slides("Menu").SlideIndex
```

Although this is a little more complicated than simply using a number, it is a lot safer because slide names never change unless you change them. In case you care how this works, the second line just takes the slide named “Menu” and finds out what number it is to use with `GotoSlide`.

You never have to use shape names or slide names. You can do everything you want with numbers. However, as you make more complicated presentations with more slides and more shapes, and you begin to change slides and shapes around, using names will save you a lot of grief. When you move shapes, delete slides, reorder slides, insert slides, change the display order of shapes, etc., your slide and shape names will remain the same, and your VBA code will continue to work.

Let’s Get Started Again

For the rest of the book, almost all of the examples will use shape names (and usually slide names, too) instead of numbers. But first, we have to backtrack to fix the example in the “Let’s Get Started” section to use names. Let’s change all the shape numbers to shape names.

First, use what you learned in the previous section to name the stars (on slides 2 and 3) to something like “GoodJobStar.” It doesn’t matter what you name them as long as you use the same thing when you name them and when you write your code.

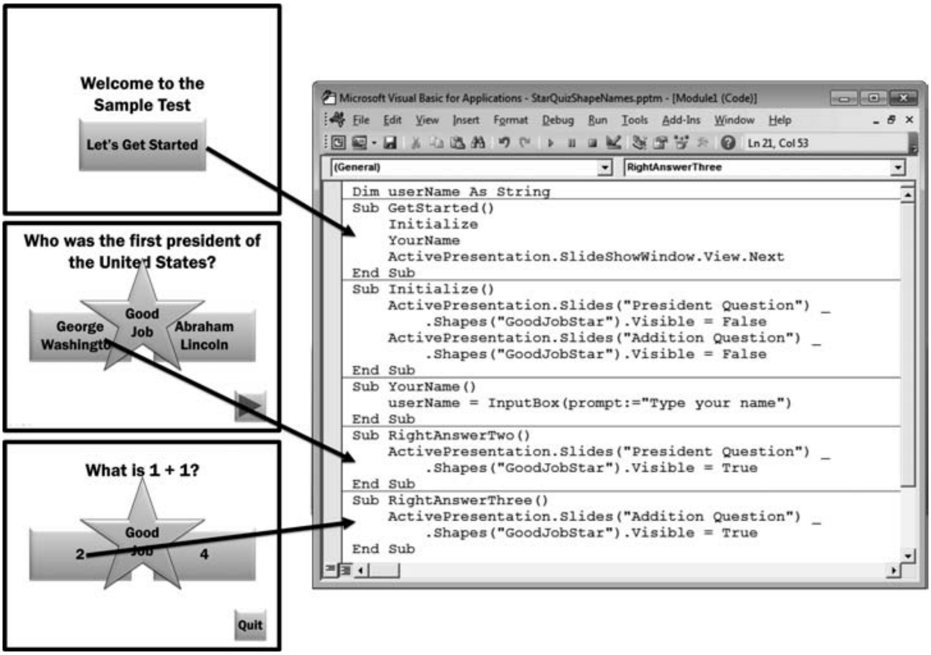
Next, every place we referred to the star by number (`Shapes(4)` in the example), we can use the name “GoodJobStar” (`Shapes("GoodJobStar")`). We did that in the `Initialize`, `RightAnswerTwo`, and `RightAnswerThree` procedures.

```
Sub Initialize()
   ActivePresentation.Slides(2).Shapes("GoodJobStar").Visible = False
   ActivePresentation.Slides(3).Shapes("GoodJobStar").Visible = False
End Sub

Sub RightAnswerTwo()
   ActivePresentation.Slides(2).Shapes("GoodJobStar").Visible = True
End Sub

Sub RightAnswerThree()
   ActivePresentation.Slides(3).Shapes("GoodJobStar").Visible = True
End Sub
```

For something this simple, I would probably stick with slide numbers, but for a bigger project that might have a slide added, moved, or deleted, I would use slide names. We can do that here. Use the `SetSlideName` procedure from the previous section to name slide 2 “President Question” and slide 3 "Addition Question." Now, wherever we have Slides(2), we can use Slides("President Question"), and wherever we have Slides(3), we can use Slides("Addition Question"). Because the lines are getting a little long, we'll use the underscore to wrap them onto the next line:

```
Sub Initialize()
   ActivePresentation.Slides("President Question") _
        .Shapes("GoodJobStar").Visible = False
   ActivePresentation.Slides("Addition Question") _
        .Shapes("GoodJobStar").Visible = False
End Sub

Sub RightAnswerTwo()
   ActivePresentation.Slides("President Question") _
        .Shapes("GoodJobStar").Visible = True
End Sub

Sub RightAnswerThree()
   ActivePresentation.Slides("Addition Question") _
        .Shapes("GoodJobStar").Visible = True
End Sub
```

Those are all the changes we need, so let's put it all together in Figure 7.4. This figure is the same as Figure 7.2, except that the code has changed.


Welcome to the Sample Test
Let's Get Started
Who was the first president of the United States?
George Washington
Good Job
Abraham Lincoln
What is 1 + 1?
2
Good Job
4
Quit
Microsoft Visual Basic for Applications - StarQuizShapeNames.pptm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Ln 21, Col 53
(General)
RightAnswerThree

```
Dim userName As String
Sub GetStarted()
    Initialize
    YourName
    ActivePresentation.SlideShowWindow.View.Next
End Sub
Sub Initialize()
    ActivePresentation.Slides("President Question") _
        .Shapes("GoodJobStar").Visible = False
    ActivePresentation.Slides("Addition Question") _
        .Shapes("GoodJobStar").Visible = False
End Sub
Sub YourName()
    userName = InputBox(prompt:="Type your name")
End Sub
Sub RightAnswerTwo()
    ActivePresentation.Slides("President Question") _
        .Shapes("GoodJobStar").Visible = True
End Sub
Sub RightAnswerThree()
    ActivePresentation.Slides("Addition Question") _
        .Shapes("GoodJobStar").Visible = True
End Sub
```

Figure 7.4. Simple Quiz Showing Stars for Correct Answers Using Shape Names

Hiding and Showing Bug in PowerPoint 2007 Revisited

Hiding and showing does not always work properly in PowerPoint 2007. You can see this error if you have code to show a shape and it doesn't show, but when you quit out of Slide Show View, the shape is there. In this case, you can use an alternative method to hide and show shapes. Instead of hiding and showing the shapes, you can move them off the viewable area of the slide and move them back again. For the example in this section, you can "hide" the shapes with this Initialize procedure:

```
Sub Initialize()
   ActivePresentation.Slides("President Question") _
        .Shapes("GoodJobStar").Top = -3000
   ActivePresentation.Slides("Addition Question") _
        .Shapes("GoodJobStar").Top = -3000
End Sub
```

Showing the shapes is a bit trickier because you have to put the shape back in the right place. You can guess and adjust with something like this for the RightAnswer Procedure:

```
Sub RightAnswerTwo()
   ActivePresentation.Slides("President Question") _
        .Shapes("GoodJobStar").Top = 150
End Sub
```

And then adjust the number 150 until it is in the right place. If you have a lot of shapes that need this adjustment, you might use a little macro to find out where the shape is now:

```
Sub WhereAmI()
   MsgBox ActiveWindow.Selection.ShapeRange.Top
End Sub
```

This is one of our utility macros that works just like the macro for getting the name of the shape (see "What's in a Name?" pp. 98–100). Select the shape you want in Normal View, run the macro, and it pops up a message that tells you where the shape is now. Use that number in place of `150` in the earlier code to put the shape right back where it was. We won't mention this bug again because it only affects PowerPoint 2007, but you can use this trick any time you see `.Visible` in code throughout the book.

This Slide or Another Slide

In the previous examples, our scripts to hide and show objects specified which slides contained the objects. Sometimes you want an action to affect the current slide without regard to which number slide it is. For example, you might want to show an object on the current slide or add some text to a text box on the current slide or change the color of a menu item on the current slide. This is particularly useful when you want to write one procedure that will work on several slides. For example, if our `RightAnswer` procedure revealed a star and each slide had a star with the same name or number, we could add a line to `RightAnswer` to show the star on the current slide. One `RightAnswer` procedure would be used for all the slides instead of `RightAnswerTwo`, `RightAnswerThree`, etc.

Sometimes you might want an action to affect another slide. You might be on one slide but wish to have something change on another slide, as we saw in our `Initialize` procedure. In the `Initialize` example, we wanted the slide to be set up properly before the user got there, so the change happened to the other slides when the user was on the first slide. We also want changes to happen before we arrive at a slide. If we hide our star (or change text on a slide or change the color of menu items) just as we arrive at a slide, the hidden object will be on the screen for a split second before disappearing. In some cases, this might not be a big problem, but if the action is to hide the answer to the question, this could be very important.

Anything affecting the current slide will start with

```
ActivePresentation.SlideShowWindow.View.Slide
```

This simply refers to the slide that is currently showing in Slide Show View. For example, if you want to hide a shape named “GoodJobStar” on the current slide, you would use this line:

```
ActivePresentation.SlideShowWindow.View.Slide _
   .Shapes("GoodJobStar").Visible = False
```

Anything affecting another slide will start with

```
ActivePresentation.Slides("NAME")
```

where `NAME` is replaced by the name of the slide (you can use numbers as well). So, for example, if you want to hide the “GoodJobStar” shape on the “President Question” slide, you would use this line:

```
ActivePresentation.Slides("President Question") _
   .Shapes("GoodJobStar").Visible = False
```

Any expression throughout this book that uses a statement to affect the current slide can be changed to use a statement for another slide, and any expression that uses a statement to affect another slide can be changed to use a statement for the current slide.

Now, we can rework our example to use one `RightAnswer` procedure, instead of one for every question:

```
Dim userName As String

Sub GetStarted()
   Initialize
   YourName
   ActivePresentation.SlideShowWindow.View.Next
End Sub

Sub Initialize()
   ActivePresentation.Slides("President Question") _
        .Shapes("GoodJobStar").Visible = False
   ActivePresentation.Slides("Addition Question") _
        .Shapes("GoodJobStar").Visible = False
End Sub

Sub YourName()
   userName = InputBox(prompt:="Type your name")
End Sub

Sub RightAnswer() 'Only one RightAnswer procedure needed
   ActivePresentation.SlideshowWindow.View.Slide _
        .Shapes("GoodJobStar").Visible = True
End Sub
```

The only thing that has changed here is that we replaced all the `RightAnswer` procedures with one `RightAnswer` procedure so the “GoodJobStar” shape will show up on the current slide **as long as the current slide has a shape named “GoodJobStar.”** Click the right answer on slide 2, and it will show the “GoodJobStar” on slide 2. Click the right answer on slide 3, and it will show the “GoodJobStar” on slide 3. If you are editing one of the earlier examples, be sure to tie all the right answer buttons to the new `RightAnswer` procedure.

I Lost My Shapes

Now that you have started hiding and showing shapes, you might run into a bit of a problem: hidden shapes are hidden. You can’t see them. You can’t move them. Unless you know that they’re there, you can’t unhide them. This can happen if you type some code to hide a shape and forget to type the code to unhide it or if you mess up the code to unhide a shape. The problem compounds if you re-create the shape, thinking that it is not there. You might end up with two shapes of the same name (not a good idea) or many shapes that you don't want.

There are two ways to solve this problem. In PowerPoint 2007 and 2010, simply selecting the shape in the Selection Pane (go to the **Home tab** of the Ribbon, choose **Select** and **Selection Pane**) will make an individual shape visible again if it was invisible. In other versions you will need code. The code is helpful in 2007 and 2010 as well because you have to know to look for the shape to find it in the Selection Pane. The following code unhides (sets the `.Visible` property to `True`) for all shapes in your presentation. Don't worry about how it works for now. Just stick the code in your module (possibly in Module 2 with the shape-naming procedures) and run it whenever you want to show all your shapes.

```
Sub ShowItAll()
   Dim oSld As Slide
   Dim oShp As Shape

   For Each oSld In ActivePresentation.Slides
        For Each oShp In oSld.Shapes
          oShp.Visible = True
        Next oShp
   Next oSld
End Sub
```

Putting the Student's Input into a Box

Up until now, we have been asking students to type a name and not using it much, if at all. We used it in Chapter 6 to say "Good job" with the name when a student clicked the right answer. We can also put the text in a shape, such as our "GoodJobStar" shape. First, we need to know how to access the shape in VBA. We have been doing that all along with the shape name or number. The "GoodJobStar" shape on the current slide is

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("GoodJobStar")
```

Remember that shapes have properties. We have already played with the `.Visible` property by setting it to `True` or `False` and the `.Name` property. Text is a little more complicated. A shape doesn't just have a `.Text` property (the `.Text` is part of the `.TextRange`, which is part of the `.TextFrame`); just think of `.TextFrame.TextRange.Text` as the text property. Thus, we can find the text in a shape that has text, such as the "GoodJobStar" shape, with

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("GoodJobStar") _
   .TextFrame.TextRange.Text
```

If we want to set the text in that shape, we can do it with

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("GoodJobStar") _
   .TextFrame.TextRange.Text = "Good job"
```

This is only useful if we don't know what text we want to put in the shape in advance. If we know in advance, we would just use traditional PowerPoint features, not VBA, to add the text. However, if the text varies based on what the user types or clicks, this is very powerful, so let's put this together with `YourName` and `Initialize` to put the user's name in the text box. Note that I have added some comments to the code to explain it along the way. The comments are just for the human reader so you don't have to type them.

```
Dim userName As String

'Link this to the first button on the title slide.
Sub GetStarted()
   Initialize 'Hide the stars
   YourName 'Ask for the name
   ActivePresentation.SlideShowWindow.View.Next 'Go to the next slide
End Sub

'GetStarted calls this so no buttons link to this directly.
'This assumes that slides 2 and 3 will have the shape "GoodJobStar"
'you will want to show when the right answer is chosen.
Sub Initialize()
   ActivePresentation.Slides("President Question") _
        .Shapes("GoodJobStar").Visible = False
   ActivePresentation.Slides("Addition Question") _
        .Shapes("GoodJobStar").Visible = False
End Sub

'GetStarted calls this to ask for a name. Use any YourName procedure
Sub YourName()
   userName = InputBox(prompt:="Type your name")
End Sub

'Link this to the button that contains the right answer on each slide.
'Be sure you have used your drawing tools to create the 4th shape
'on each slide.
'Note that this RightAnswer does not automatically go to the next
'slide.
Sub RightAnswer() 'Only one RightAnswer procedure needed
   ActivePresentation.SlideshowWindow.View.Slide.Shapes("GoodJobStar") _
        .TextFrame.TextRange.Text = "Good job, " & userName
   ActivePresentation.SlideshowWindow.View.Slide.Shapes("GoodJobStar") _
        .Visible = True
End Sub
```

You have seen most of this before. `GetStarted`, `Initialize`, and `YourName` are just like what we used earlier. The only new thing is in `RightAnswer`. Rather than using a simple string, like “Good Job,” for the text in the object, we put together some text with the user’s name.

Manipulating Text in Objects

In the previous section, we changed the text in a shape by accessing the shapes `.TextFrame.TextRange.Text`. Now that you have access to that part of a shape, you can do whatever you want to the text in that shape. This is useful for changing the text in shapes you draw with the drawing tools, in shapes you create with VBA with `AddShape` (see Chapter 9), and in shapes that come with PowerPoint slides (such as the title or content area on a slide). But you can do more than simply change the text on a shape to something new. You can manipulate the text in many different ways. This section doesn’t cover all of them, but it is enough to get you started exploring.

> PowerPoint 2007, 2010, and 2011 introduced `TextFrame2`. This can be used to access some of the new text features that were introduced in those versions (such as some different font spacing options). You can use `TextFrame2` in place of `TextFrame`, but `TextFrame2` won’t work in earlier versions of PowerPoint. This book doesn’t discuss any of the new font features so we will stick with `TextFrame` in all of the examples that follow.

`With` Blocks

Before changing the text, we should learn a simple VBA trick to save you from typing long expressions over and over again. You might have noticed that to get to the text for a shape, you have to type something very long, such as

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("GoodJobStar") _
   .TextFrame.TextRange.Text
```

This refers to the text in the “GoodJobStar” shape in the current slide (it’s interesting how I can say it in English in less space than I can say it in VBA). To save typing, we can use a `With` block. For example, if we want to do several things to the “GoodJobStar” shape on the current slide, we can do the following:

```
With ActivePresentation.SlideShowWindow.View.Slide.Shapes("GoodJobStar")
   .TextFrame.TextRange.Text = "Hello"
   .Fill.ForeColor.RGB = vbRed
   .Visible = True
End With
```

The `With` block (starting with the first line that begins with `With` and ending with the line that ends with `End With`) simply assumes that anything starting with a dot really includes all the stuff on the `With` line. In English, it is saying, "I want to do the following things to the "GoodJobStar" shape on the current slide: change the text to 'Hello,' change the background color to red, and make the shape visible."

Adding Text

Now, suppose you want to add something to the text in your shape, rather than replace the text. Remember the ampersand (&). This is used to join two pieces of text together. We used it when we wanted to display text in a `MsgBox` that included "You are doing well" and the user's name. We can use it here to join what is already in the text box with some additional text. Once we join together the text, we need to stick the joined-together text into the `.Text` of the shape.

```
Sub AddHello()
   With ActivePresentation.SlideShowWindow.View.Slide _
        .Shapes("Content Placeholder 2")
        .TextFrame.TextRange.Text = _
            .TextFrame.TextRange.Text & Chr$(13) & "Hello Mother"
   End With
End Sub
```

The `With` line (including the next line that is really part of that line due to the underscore) tells the computer that we are going to do something with the shape named "Content Placeholder 2" on the current slide. If the current slide has a Title and Content slide layout, "Content Placeholder 2" refers to the content area (the main area for text) because when you create a Title and Content slide, it names the content area "Content Placeholder 2."

```
.TextFrame.TextRange.Text = _
```

tells the computer that we are going to put something into the text area of that slide. After the equal sign, the next line

```
.TextFrame.TextRange.Text & Chr$(13) & "Hello Mother"
```

tells the computer what we are going to put into the text area. We are going to

- start with what is already there (`.TextFrame.TextRange.Text`);
- add to that a special character, `Chr$(13)`, which is the New Paragraph symbol (just like hitting "Enter" or "Return" if you were typing the text into the text area yourself); and
- add the text "Hello Mother"

This will have the effect of taking what was already in the bulleted list and adding a new line with the words "Hello Mother." Remember, you can do anything with the text that you want. We added "Hello Mother" as a simple example. You could have added the user's name. For example, you might write an interactive story with your students in which the student types a name at the beginning of the story, and the name is used during the story by replacing or modifying the text in one of the slides:

```
Sub BrickPig()
   With ActivePresentation.Slides(7).Shapes("Content Placeholder 2")
        .TextFrame.TextRange.Text = .TextFrame.TextRange.Text & _
        "And then the third pig, " & userName & _
        ", built a house of bricks. The brick house " & _
        "was very strong."
   End With
End Sub
```

This takes the shape named "Content Placeholder 2" on the seventh slide and adds text to it that includes the user's name (assuming you have used the `YourName` procedure at some previous point to get the user's name). If the shape to which you are adding text is a Placeholder (one of those boxes that starts out saying "Click to add …"), some older versions of PowerPoint require it to have something in it when you try to run this code, or your text will not show up until after you exit Slide Show View. Also, older versions might not name the content area "Content Placeholder 2," so you should check the name of that shape before using this code.

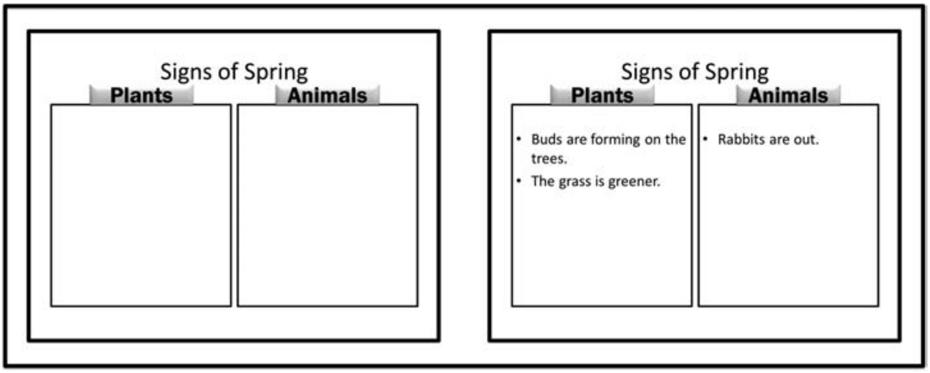
As another example, imagine that you are having a class discussion, and you want to record the students' comments in your PowerPoint presentation. Perhaps you are discussing the signs of spring, and you want the class to tell you signs of spring related to plants and animals. Without technology, you would write the information on the blackboard. However, this is awkward if you are using PowerPoint as part of the discussion; it is awkward to run from the computer to the blackboard, and it is awkward to flip the lights off and on so students can see the screen and the blackboard alternately. Instead, use this simple code to put the text right into the PowerPoint presentation:

```
Sub AddPlants()
   Dim newstuff As String

   newstuff = InputBox("What is a plant sign of Spring?")
   If newstuff <> "" Then
        With ActivePresentation.SlideShowWindow.View.Slide _
            .Shapes("Content Placeholder 2").TextFrame.TextRange
            .Text = .Text & Chr$(13) & newstuff
        End With
   End If
End Sub
```

```
Sub AddAnimals()
   Dim newstuff As String

   newstuff = InputBox("What is an animal sign of Spring?")
   If newstuff <> "" Then
        With ActivePresentation.SlideShowWindow.View.Slide _
            .Shapes("Content Placeholder 3").TextFrame.TextRange
            .Text = .Text & Chr$(13) & newstuff
        End With
   End If
End Sub
```

This code works on a slide with two text boxes that are named "Content Placeholder 2" and "Content Placeholder 3," which are the default names for the text areas in a Two Content Slide layout. Of course, you can create any text boxes and give them whatever names you like and use those names in your code.

The code works with the slide shown in Figure 7.5. This figure shows the slide before and after typing some text. In this case, you would have pressed the Plant button (which is tied to the `AddPlant` procedure) twice and the Animal button (which is tied to the `AddAnimal` procedure) once, having been prompted by an `InputBox` each time to name a sign of spring. The `If` statement in each procedure (along with the corresponding `End If`) can be left off, but it provides you with an escape if you accidentally hit the wrong button: Simply click OK without typing anything. The `If` statement asks if you have typed something (i.e., the text you typed is not the empty string), and it only adds the text to the slide if the answer is yes.



Signs of Spring

Plants

Animals

Signs of Spring

Plants

- Buds are forming on the trees.
- The grass is greener.

Animals

- Rabbits are out.

Figure 7.5. Signs of Spring Discussion Slide—Before and After

Of course, the entire example could be simplified with one procedure, one text box, and one button if you don't want to organize student responses into two columns. It can also be complicated by adding more similar procedures, more text boxes, and more buttons if you want to divide student responses into more than two areas.

Manipulating Parts of Text in an Object

`TextRange` is an interesting creature. The `TextRange` of a shape refers to the entire text in that shape, but anything you can do to a `TextRange`, you can do to a part of a `TextRange`. You can do things to specific paragraphs within the `TextRange`, specific words within the `TextRange`, and specific characters within the `TextRange`.

For example, if you wanted to change to blue the color of the text in the entire shape named "Color Shape" of the current slide, you could use the following code:

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("Color Shape") _
   .TextFrame.TextRange.Font.Color.RGB = vbBlue
```

Almost identical code can be used to change the second *paragraph* of the shape named "Color Shape" on the current slide to blue:

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("Color Shape") _
   .TextFrame.TextRange.Paragraphs(2).Font.Color.RGB = vbBlue
```

Note that paragraphs include the New Paragraph symbol, `Chr$(13)`, as part of the paragraph. Thus, you must be careful when changing the text of a paragraph to be sure that each paragraph ends with `Chr$(13)`. See the Mystery Example later in this chapter for an example of this. With another small change, the second *word* becomes blue:

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("Color Shape") _
   .TextFrame.TextRange.Words(2).Font.Color.RGB = vbBlue
```

Note that VBA counts punctuation marks as words. For example, the text "Hello, my name is David" has six words (by VBA's count; who said computers were smart?), with the comma being the second word. With another small change, the second *character* becomes blue:

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("Color Shape") _
   .TextFrame.TextRange.Characters(2).Font.Color.RGB = vbBlue
```

Finally, any of these statements can be altered slightly to include a range of paragraphs, words, or characters. Simply include a second number after the "2" to tell how many paragraphs, words, or characters you want to affect. For example, if you want to make seven characters blue, starting with the second one, you would use the following:

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("Color Shape") _
   .TextFrame.TextRange.Characters(2,7).Font.Color.RGB = vbBlue
```

If the text is “Hello, mother,” then the characters “ello, m” would turn blue (the comma and space count as the fifth and sixth characters).

What Can You Change?

All of the prior examples changed the color of the text using `.Font.Color.RGB`. This is one of many things that you can change about the font of the text. You can change `Bold`, `Italic`, `Shadow`, and `Underline` to `True` or `False`. For example:

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("Color Shape") _
   .TextFrame.TextRange.Font.Bold = True
```

This is the same as if you had selected the text and clicked on the **Bold button** in the toolbar or Ribbon.

You can also set the `Size` of the text to a particular point size. For example, if you wanted to change the text to a 12-point font size, you could use the following:

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("Color Shape") _
   .TextFrame.TextRange.Font.Size = 12
```

You can change the `Name` of the font, but you should beware; if this presentation is running on a variety of computers, you should stay away from fonts that are not standard because your font will only show up properly if the computer on which the presentation is running has the font. To change the font to Helvetica, you can use the following example:

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("Color Shape") _
   .TextFrame.TextRange.Font.Name = "Helvetica"
```

Finally, you can change the color in a number of ways. You have already seen that you can choose from some VBA constant colors: `vbBlack`, `vbRed`, `vbGreen`, `vbYellow`, `vbBlue`, `vbMagenta`, `vbCyan`, and `vbWhite`. You can also set colors by using an RGB value. RGB stands for Red Green Blue. You will specify a color by indicating how much red, how much green, and how much blue the color contains. For example, to make the text red, you could use the following:

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("Color Shape") _
   .TextFrame.TextRange.Font.Color.RGB = RGB(255,0,0)
```

This means that you want lots of red, no green, and no blue (the numbers range from 0 to 255). You can experiment with the numbers to find just the right shade you want. For example, `RGB(150,0,75)` gives a lovely shade of purple.

Other Things You Can Do to Text

Many things that traditional PowerPoint can do to text, VBA can do as well. If you want to make changes while creating a presentation, using PowerPoint's traditional tools is probably easiest. VBA is useful when you want to change things in response to something the user does. You can use VBA to `Cut`, `Copy`, `Delete`, or `Paste` text:

```
ActivePresentation.SlideShowWindow.View.Slide.Shapes("Color Shape") _
   .TextFrame.TextRange.Words(3,2).Cut
ActivePresentation.SlideShowWindow.View.Slide.Shapes("Color Shape") _
   .TextFrame.TextRange.Words(4,2).Paste
```

This will cut the third and fourth words in the "Color Shape" shape of the current slide (remember the "3,2" means start with the third word and do this for two words). Next it will find the fourth and fifth words (counting words without the text that was just cut) and replace them with what you cut. So if the text was "one two three four five six seven eight nine ten," the `Cut` will change the text to "one two five six seven eight nine ten," and the `Paste` will change it to "one two five three four eight nine ten." Change the `Cut` to `Delete` to get rid of the text without the ability to paste it, and change it to `Copy` to copy the text without removing it from the original location.

You can also find out how long (i.e., how many characters) a `TextRange` is with `Length`:

```
MsgBox ActivePresentation.SlideShowWindow.View.Slide _
   .Shapes("Color Shape").TextFrame.TextRange.Length
```

This will pop up a `MsgBox` with the number of characters in the shape named "Color Shape" of the current slide.

Finally, you might want to know how many words or paragraphs are in a `TextRange`. You can use `Count` to find this out:

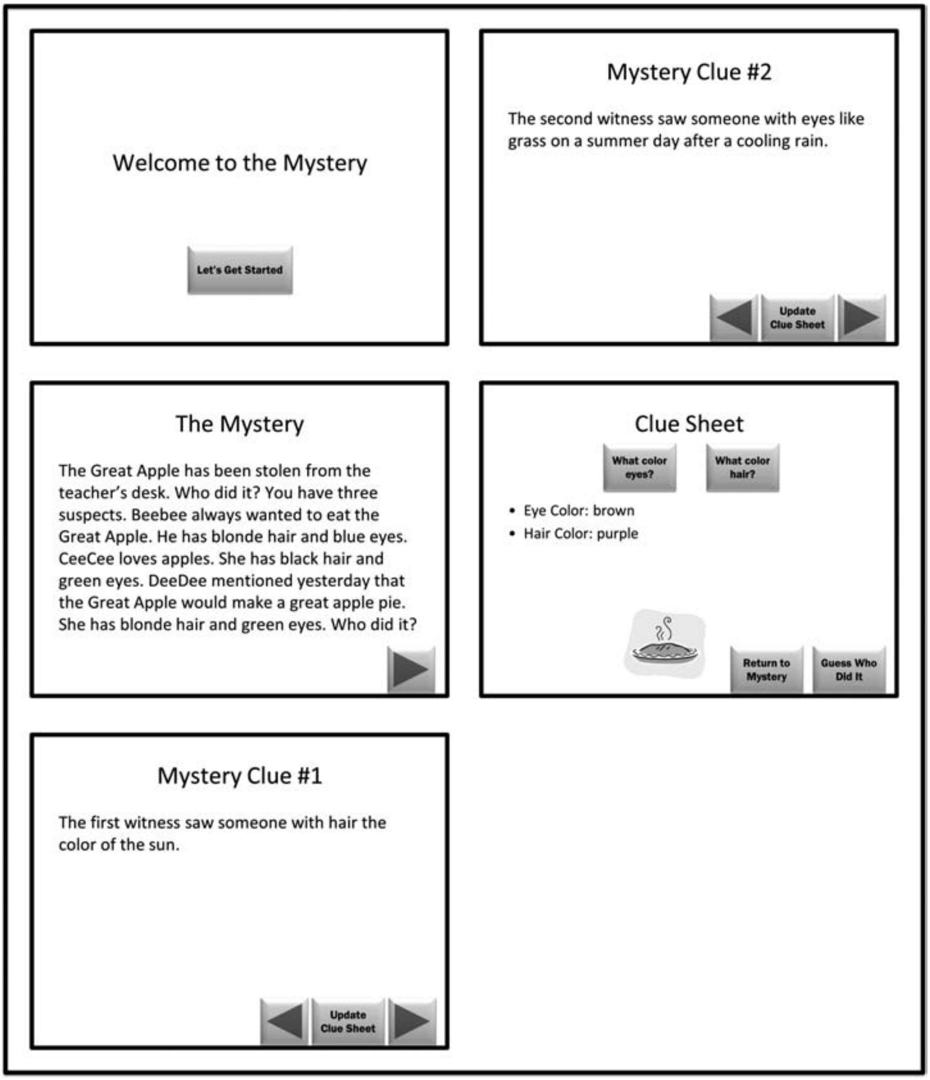
```
MsgBox ActivePresentation.SlideShowWindow.View.Slide _
   .Shapes("Color Shape").TextFrame.TextRange.Paragraphs.Count
```

This will pop up a `MsgBox` with the number of paragraphs (change `Paragraphs` to `Words` to get the number of words).

Manipulating Text: The Mystery Example

You have seen many tricks for manipulating text, but you might be wondering how they might fit into a real example. This section includes a simple example of a presentation that solves a mystery. This is a simple mystery with only two clues, but you should be able to expand it to include more clues. Figure 7.6 shows the slides in this mystery. Figure 7.7 shows the VBA code for the presentation.

In this simple example, most of the navigation is done with traditional PowerPoint buttons. The forward and back arrows are linked to the next and previous slides, the "Update Clue Sheet" button is linked to the last slide, and the "Return to Mystery" button is linked to the last slide viewed (i.e., if the user just came from Mystery Clue #1, it will go back to Mystery Clue #1).



Welcome to the Mystery

Mystery Clue #2

The second witness saw someone with eyes like grass on a summer day after a cooling rain.

The Mystery

The Great Apple has been stolen from the teacher's desk. Who did it? You have three suspects. Beebee always wanted to eat the Great Apple. He has blonde hair and blue eyes. CeeCee loves apples. She has black hair and green eyes. DeeDee mentioned yesterday that the Great Apple would make a great apple pie. She has blonde hair and green eyes. Who did it?

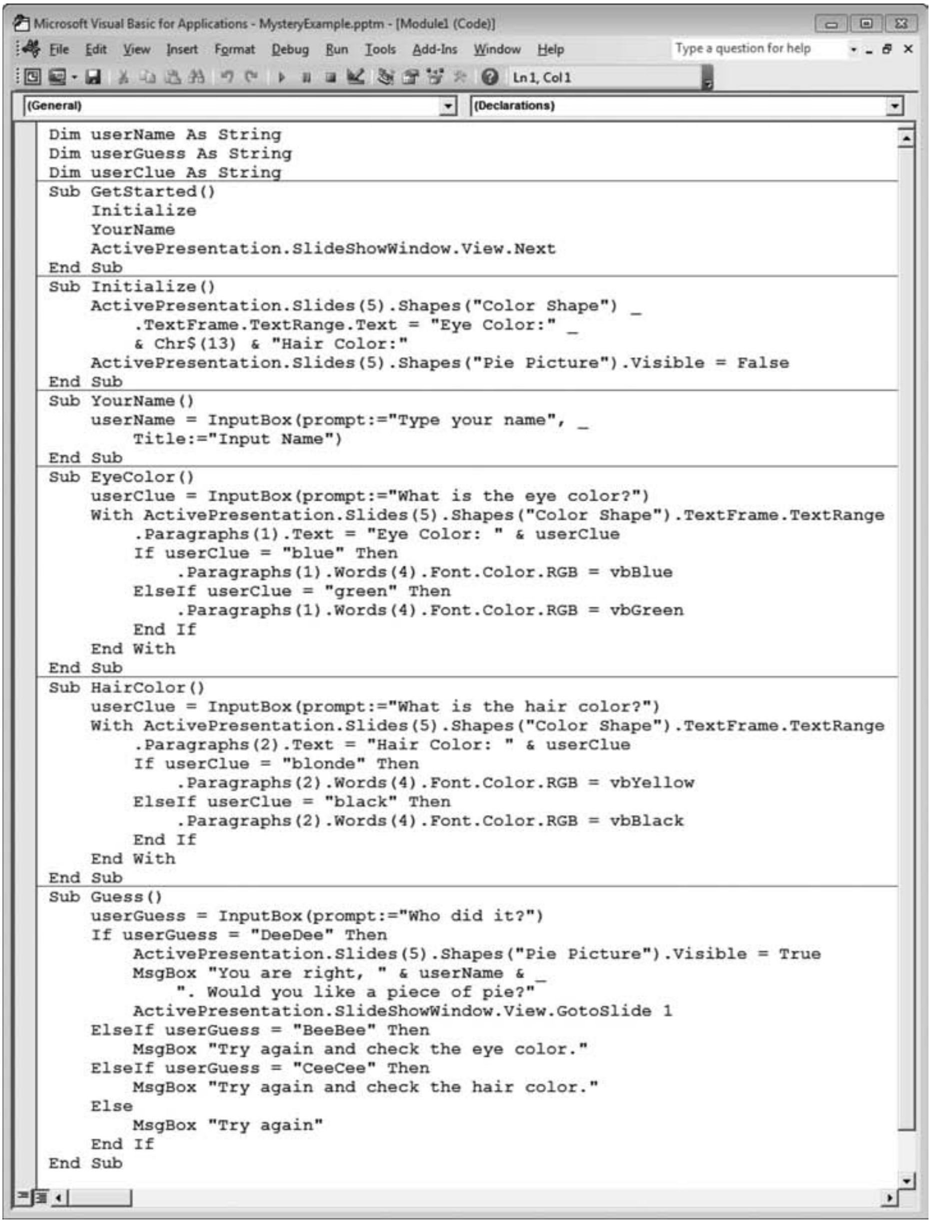
Clue Sheet

- Eye Color: brown
- Hair Color: purple

Mystery Clue #1

The first witness saw someone with hair the color of the sun.

Figure 7.6. The Mystery Presentation Slides


Microsoft Visual Basic for Applications - MysteryExample.pptm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
Ln 1, Col 1
(General)
(Declarations)

```
Dim userName As String
Dim userGuess As String
Dim userClue As String
Sub GetStarted()
    Initialize
    YourName
    ActivePresentation.SlideShowWindow.View.Next
End Sub
Sub Initialize()
    ActivePresentation.Slides(5).Shapes("Color Shape") _
        .TextFrame.TextRange.Text = "Eye Color:" _
        & Chr$(13) & "Hair Color:"
    ActivePresentation.Slides(5).Shapes("Pie Picture").Visible = False
End Sub
Sub YourName()
    userName = InputBox(prompt:="Type your name", _
        Title:="Input Name")
End Sub
Sub EyeColor()
    userClue = InputBox(prompt:="What is the eye color?")
    With ActivePresentation.Slides(5).Shapes("Color Shape").TextFrame.TextRange
        .Paragraphs(1).Text = "Eye Color: " & userClue
        If userClue = "blue" Then
            .Paragraphs(1).Words(4).Font.Color.RGB = vbBlue
        ElseIf userClue = "green" Then
            .Paragraphs(1).Words(4).Font.Color.RGB = vbGreen
        End If
    End With
End Sub
Sub HairColor()
    userClue = InputBox(prompt:="What is the hair color?")
    With ActivePresentation.Slides(5).Shapes("Color Shape").TextFrame.TextRange
        .Paragraphs(2).Text = "Hair Color: " & userClue
        If userClue = "blonde" Then
            .Paragraphs(2).Words(4).Font.Color.RGB = vbYellow
        ElseIf userClue = "black" Then
            .Paragraphs(2).Words(4).Font.Color.RGB = vbBlack
        End If
    End With
End Sub
Sub Guess()
    userGuess = InputBox(prompt:="Who did it?")
    If userGuess = "DeeDee" Then
        ActivePresentation.Slides(5).Shapes("Pie Picture").Visible = True
        MsgBox "You are right, " & userName & _
            ". Would you like a piece of pie?"
        ActivePresentation.SlideShowWindow.View.GotoSlide 1
    ElseIf userGuess = "BeeBee" Then
        MsgBox "Try again and check the eye color."
    ElseIf userGuess = "CeeCee" Then
        MsgBox "Try again and check the hair color."
    Else
        MsgBox "Try again"
    End If
End Sub
```

Figure 7.7. The Mystery Presentation VBA Code

The buttons that use VBA are on the first and last slides. The first slide has the “Let’s Get Started” button that links to the `GetStarted` script. As with several of our other examples, `GetStarted` initializes, asks for a name, and moves to the next slide.

Although we don't have to initialize any variables, we do have to set up the last slide. This involves setting up the text area (which is the shape named "Color Shape") on the fifth slide with text:

```
ActivePresentation.Slides(5).Shapes("Color Shape") _
   .TextFrame.TextRange.Text = "Eye Color:" _
   & Chr$(13) & "Hair Color:"
```

This simply puts two lines of text, "Eye Color" and "Hair Color," with a new paragraph code between them so they end up on different lines.

We also want to hide the picture of the apple pie (which is the shape named "Pie Picture" on the fifth slide) because it will only be shown when the user gets the right answer:

```
ActivePresentation.Slides(5).Shapes("Pie Picture").Visible = False
```

If you add more clues, update the `Initialize` procedure to refer to whatever slide number is the last slide. That is, change the `5` to another number in both lines referring to the slide. Alternatively, use slide names instead.

`EyeColor` and `HairColor` are almost identical. The main difference is that `EyeColor` changes the text in the first paragraph and `HairColor` changes the text in the second paragraph. `EyeColor` uses an `InputBox` to prompt for the eye color and stores what the user types in the variable `userClue`. The `With` statement is just like the `With` in `GetStarted`, referring to the `TextRange` where the clues are stored. The code:

```
.Paragraphs(1).Text = "Eye Color: " & userClue
```

changes the first paragraph (the one that includes the eye color clue) to whatever the user typed.

> `.Paragraphs` has changed slightly since PowerPoint 2003/2004. In the earlier versions `.Paragraphs(1).Text = "Eye Color: " & userClue` would replace the text of the first paragraph, including the new paragraph symbol, with the text on the right side of the equal sign. This would result in removing the new paragraph symbol and running the text together. In PowerPoint 2007 and later, the paragraph symbol stays intact. Thus in 2003/2004 and earlier, that line should change to:
>
> ```
> .Paragraphs(1).Text = "Eye Color: " & userClue & Chr$(13)
> ```
>
> to put back the new paragraph symbol `Chr$(13)` and keep the lines separate.

The If statement then checks to see if what was typed was “blue”:

```
If userClue = "blue" Then
```

If it is, it changes the color of the fourth word (which would be the word “blue”) to blue:

```
.Paragraphs(1).Words(4).Font.Color.RGB = vbBlue
```

The ElseIf part checks to see if the user typed green and changes the color of the text to green.

Guess uses an InputBox to ask for the user’s guess. The part that checks for the correct answer is a series of If, ElseIf, ElseIf, ElseIf, and Else statements. The If section is for the right answer. It shows the picture of the apple pie (because DeeDee wanted the apple to make pie):

```
ActivePresentation.Slides(5).Shapes("Pie Picture").Visible = True
```

It shows a MsgBox telling the user that the answer is correct:

```
MsgBox "You are right, " & userName & _
   ". Would you like a piece of pie?"
```

And when the user clicks OK on the MsgBox, it jumps back to the beginning (slide 1):

```
ActivePresentation.SlideShowWindow.View.GotoSlide 1
```

The two ElseIf clauses each bring up a MsgBox with specific feedback about what was wrong, and the Else clause (if the user typed anything besides “DeeDee,” “BeeBee,” or “CeeCee”) brings up a MsgBox that gives the generic feedback “Try again.”

To create your own mystery, simply change text on the mystery and clue slides, change the text in the VBA code that refers specifically to eye color and hair color (in case your clues are about something else), change the text on the eye color and hair color buttons, and change the If block in the Guess procedure to give appropriate feedback for the possible guesses in your mystery. You might also want to change the picture of the apple pie to something else (just be sure the name of your picture matches the name you use in the code; I used “Pie Picture”). If you add more clues, simply copy one of the clue slides, change the text, and change Slides(5) to Slides(6) or Slides(7) or whatever number the last slide is (or name the slide and use the name).

Conclusion

In this chapter you learned some powerful VBA tricks that allow you to move around in your presentation and manipulate the objects on your slides. You now have the power to hide and show objects and manipulate the text in your objects. This allows you to expand feedback from a simple `MsgBox` to something that changes the text in the slides. For simple feedback, a `MsgBox` is fine, but to incorporate what your students have to say into the fabric of the presentation, nothing beats changing the text on your slides. The discussion ended with a creative mystery example that shows how this technology can go beyond simple tutorials and quizzes. In the next chapter you will see how to build quizzes of varying complexity with different types of questions and different ways of tracking and reporting scores.

Exercises to Try

- Create a slide show with five different slides. Make the first slide a menu. Add buttons or hypertext links from the menu to each of the other four slides. On the other four slides, include three buttons: a next-slide button, a previous-slide button, and a return-to-menu button. For all the buttons and hypertext links, don't use traditional PowerPoint hyperlinking; instead use VBA for all the navigation.
- Create a personalized story with VBA. Have the users type some information about themselves by clicking a button on the first slide and include those details in the story by modifying the text on the slides. Information can include some of the following: name, hometown, favorite color, friend's name, etc.
- Take the mystery example at the end of this chapter and rewrite it to include your own mystery. Start by changing the text of the mystery and updating the questions. Next, change the clue sheet to match your clues and change the apple pie picture to match your mystery.
- Expand the mystery beyond two clues by adding more clue slides and more paragraphs on the clue sheet.

8

Quizzes and Tests

Introduction

In Chapter 7 you learned a number of powerful tricks. In fact, you now have most of the basic skills you need to create a wide range of interactive projects. If you fancy yourself a programmer, you can stop here and figure everything else out for yourself. However, since this book is for scripters, we will continue with a few more tricks and many more examples.

In this chapter you will learn about different ways to create quizzes and tests with VBA. We'll start with simple multiple-choice tests, add scripts to keep score, give options for tests that only allow one try to get the right answer or allow multiple tries, add short-answer questions, add a script that creates a new slide with complete test results suitable for printing, and add a multiple-part tutorial that won't let your students take the quiz until they have completed the entire tutorial. By the time you finish this chapter, you will have the skills necessary to create quizzes in a variety of different ways.

Vocabulary

- `ActivePresentation.Slides.Add`
- `LCase`
- `numCorrect`
- `numIncorrect`
- `Round`
- `Trim`

Simple Multiple-Choice Quizzes

In Chapter 3 you learned about buttons and hyperlinks. This gave you the power to create a simple multiple-choice quiz with feedback. Without using VBA, you could create a text object and type the question in the text object. Below the text object, create buttons with possible answers. Link the button with the correct answer to a slide that has a text object that tells the student that the answer is correct. Link the buttons with the incorrect answers to a slide that has a text object that tells the student that the answer is incorrect. On the (correct and incorrect) feedback slides, create a button that leads to the next question, and repeat these steps for each question. This works, but it is a little bit cumbersome.

With a little bit of VBA from Chapter 5, you could eliminate the feedback slides and use a simple `MsgBox` for feedback, tying your buttons with right and wrong answers to the following procedures, respectively:

```
Sub RightAnswer()
   MsgBox "Good job."
End Sub

Sub WrongAnswer()
   MsgBox "Try to do better."
End Sub
```

With a little help from Chapter 6, you can include the user’s name in your feedback:

```
Dim userName As String

Sub YourName()
   userName = InputBox("What is your name?")
End Sub

Sub RightAnswer()
   MsgBox "Good job, " & userName
End Sub

Sub WrongAnswer()
   MsgBox "Try to do better, " & userName
End Sub
```

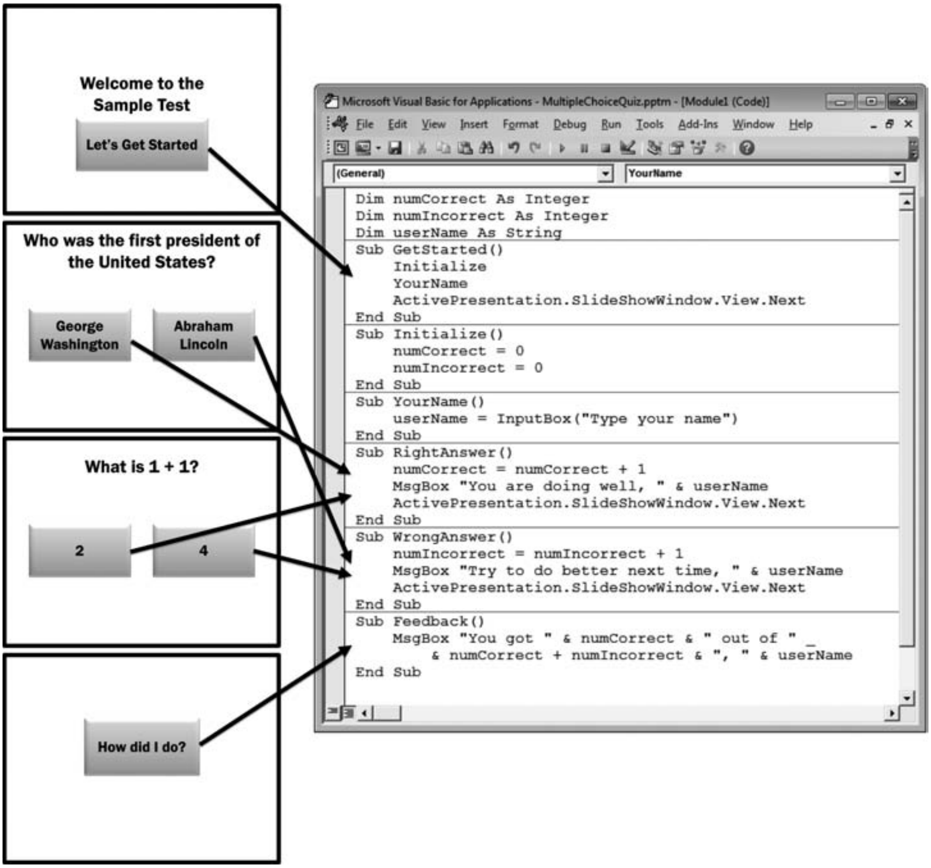
Next, add a little bit of help from Chapter 7 to automatically jump to the next question after the right answer is chosen:

```
Sub RightAnswer()
   MsgBox "Good job, " & userName
   ActivePresentation.SlideShowWindow.View.Next
End Sub
```

As usual, with a small amount of VBA, we have added a small amount of power: adding the user's name to the feedback and cutting down on the number of slides. These are small advantages over traditional PowerPoint. In the next section, we'll add more power by keeping score.

Keeping Score

If you create a quiz with the previous procedures attached to the right and wrong answers, you don't have to change your slides or buttons at all to add scorekeeping; you just need some small additions to your VBA. Figure 8.1 shows the slides for a simple quiz along with the VBA code that gives feedback and keeps score. The arrows show which buttons are tied to which procedures.


Welcome to the Sample Test
Let's Get Started
Who was the first president of the United States?
George Washington
Abraham Lincoln
What is 1 + 1?
2
4
How did I do?
Microsoft Visual Basic for Applications - MultipleChoiceQuiz.pptm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
YourName

```
Dim numCorrect As Integer
Dim numIncorrect As Integer
Dim userName As String
Sub GetStarted()
    Initialize
    YourName
    ActivePresentation.SlideShowWindow.View.Next
End Sub
Sub Initialize()
    numCorrect = 0
    numIncorrect = 0
End Sub
Sub YourName()
    userName = InputBox("Type your name")
End Sub
Sub RightAnswer()
    numCorrect = numCorrect + 1
    MsgBox "You are doing well, " & userName
    ActivePresentation.SlideShowWindow.View.Next
End Sub
Sub WrongAnswer()
    numIncorrect = numIncorrect + 1
    MsgBox "Try to do better next time, " & userName
    ActivePresentation.SlideShowWindow.View.Next
End Sub
Sub Feedback()
    MsgBox "You got " & numCorrect & " out of " _
        & numCorrect + numIncorrect & ", " & userName
End Sub
```

Figure 8.1. Multiple-Choice Quiz with Scorekeeping

Although this example only has two questions, and each question has two possible answers, this easily can be expanded to include more questions and more possible answers. In fact, the VBA script remains exactly the same. You simply add more slides and tie the buttons to the RightAnswer and WrongAnswer procedures.

In Chapter 7, we did something similar with GetStarted, Initialize, RightAnswer, and WrongAnswer, using stars for feedback and not keeping score. The significant additions to this script are the variables: numCorrect and numIncorrect. numCorrect contains the number of questions answered correctly. numIncorrect contains the number of questions answered incorrectly. Each time a correct answer is chosen, the procedure RightAnswer is called in which numCorrect is increased by one (numCorrect = numCorrect + 1). Each time a wrong answer is chosen, the procedure WrongAnswer is called in which numIncorrect is increased by one (numIncorrect = numIncorrect + 1). When you want to find out how you are doing, call the procedure Feedback to display a MsgBox with how many questions were right (numCorrect) out of how many were answered (numCorrect + numIncorrect). In addition, before the quiz starts, call the procedure GetStarted to initialize the variables (set numCorrect and numIncorrect to 0), ask for the student's name, and move to the first question. Other than the variables, all the parts of this script are things you have seen before.

You might want to report the score in other forms. Now that we know how many questions were answered correctly and how many were answered incorrectly, you can adjust the MsgBox command in the Feedback procedure to report in other ways. If you just want to report the number of right answers, try this:

```
MsgBox "You got " & numCorrect & "right, " & userName
```

If you want to report the number of right answers and the number of wrong answers but not the total, you can use this:

```
MsgBox "You got " & numCorrect & " right and " _
   numIncorrect & " wrong, " & userName
```

If you would like to report a percentage score, you can use this:

```
MsgBox "You got " & _
   100 * numCorrect / (numIncorrect + numCorrect) & "%, " & userName
```

Finally, if you want that percentage score rounded off, you can use this:

```
MsgBox "You got " & _
   Round(100 * numCorrect / (numIncorrect + numCorrect), 0) & _
   "%, " & userName
```

Note that the 0 represents how many places after the decimal point to show, so if you like the result "33%," use 0; if you like the result "33.3%," use 1; etc.

This is just the tip of the iceberg with what you can do with quizzes. Variables can be used to keep track of any information you want; for example, you could allow students to try answering a question again but only count the first try. More complicated scripts can be used to judge other kinds of quiz questions; short-answer questions are a small step away. With VBA, the possibilities are endless.

Try Again: Answer Until It's Right

Keeping score is easy when you only get one chance to answer each question. What if you want your students to answer the questions until they get them right? How difficult this is depends on how you want to keep score. If you want to count every attempt, you don't have to change much. Simply delete ActivePresentation.SlideShowWindow.View.Next from the-WrongAnswer procedure. This will stop the presentation from going to the next question after a wrong answer, but it will count every click on the wrong answer as well as the click on the right answer. For example, if you use the questions from Figure 7.1 and click on "Abraham Lincoln" (the wrong answer for question 1), then George Washington (the right answer for question 1), then 2 (the right answer for question 2), your score will be two out of three because you got the first question wrong once then right once, and you got the second question right once.

If you want to count only the first try, in the previous example you would want a score of one out of two. That is because you got the first question wrong on the first try, and you got the second question right on the first try. This requires no changes to your slides, including which buttons are tied to which procedures. It only requires the following code; changes from the code in Figure 8.1 are marked with comments ('ADDED for additions and 'DELETED for the line that is deleted):

```
Dim numCorrect As Integer
Dim numIncorrect As Integer
Dim userName As String
Dim qAnswered As Boolean 'ADDED

Sub GetStarted()
   Initialize
   YourName
   ActivePresentation.SlideShowWindow.View.Next
End Sub
```

```
Sub Initialize()
   numCorrect = 0
   numIncorrect = 0
   qAnswered = False 'ADDED
End Sub

Sub YourName()
   userName = InputBox("Type your name")
End Sub

Sub RightAnswer()
   If qAnswered = False Then 'ADDED
      numCorrect = numCorrect + 1
   End If 'ADDED
   qAnswered = False 'ADDED
   MsgBox "You are doing well, " & userName
   ActivePresentation.SlideShowWindow.View.Next
End Sub

Sub WrongAnswer()
   If qAnswered = False Then 'ADDED
      numIncorrect = numIncorrect + 1
   End If 'ADDED
   qAnswered = True 'ADDED
   MsgBox "Try to do better next time, " & userName
   'DELETED ActivePresentation.SlideShowWindow.View.Next
End Sub

Sub Feedback()
   MsgBox "You got " & numCorrect & " out of " _
      & numCorrect + numIncorrect & ", " & userName
End Sub
```

The heart of this example is the variable `qAnswered`. It keeps track of whether or not the current question has been answered yet. If it is `False`, the question has not yet been answered; if it is `True`, the question has been answered.

A small amount of code is added to the `Dim` section to declare `qAnswered` so that all the procedures know about it. It also must be initialized to `False` in the `Initialize` procedure so it is `False` when you get to the first question. Finally, `RightAnswer` and `WrongAnswer` must check and adjust the value of `qAnswered`.

`RightAnswer` and `WrongAnswer` check to see if the question has not been answered yet (`If qAnswered = False Then`) and only add one to `numCorrect` or `numIncorrect` if `qAnswered` is `False`; that is, the question has not yet been answered. In addition `RightAnswer` sets `qAnswered` to `False` before going to the next question, and `WrongAnswer` sets `qAnswered` to `True` before letting you try again (by not going to the next question). Table 8.1 follows the variables through a series of clicks.

Table 8.1. Tracking the Variables

Student clicks . . .	qAnswered	numCorrect	numIncorrect
Let’s Get Started	False	0	0
Abraham Lincoln	True	0	1
George Washington	False	0	1
2	False	1	1

Try to follow the code as the student would click on each of the buttons in the left column. First, the student clicks “Let’s Get Started” so the variables are all initialized to False, 0, and 0. When the student clicks “Abraham Lincoln” (the wrong answer), then `qAnswered` gets set to `True`. This allows the student to stay on the same slide and not have the score updated no matter what answer is clicked next. Once the “George Washington” button (the right answer) is clicked, `qAnswered` gets set back to `False` so the score can be updated when the next question is answered.

Short-Answer Quiz Questions

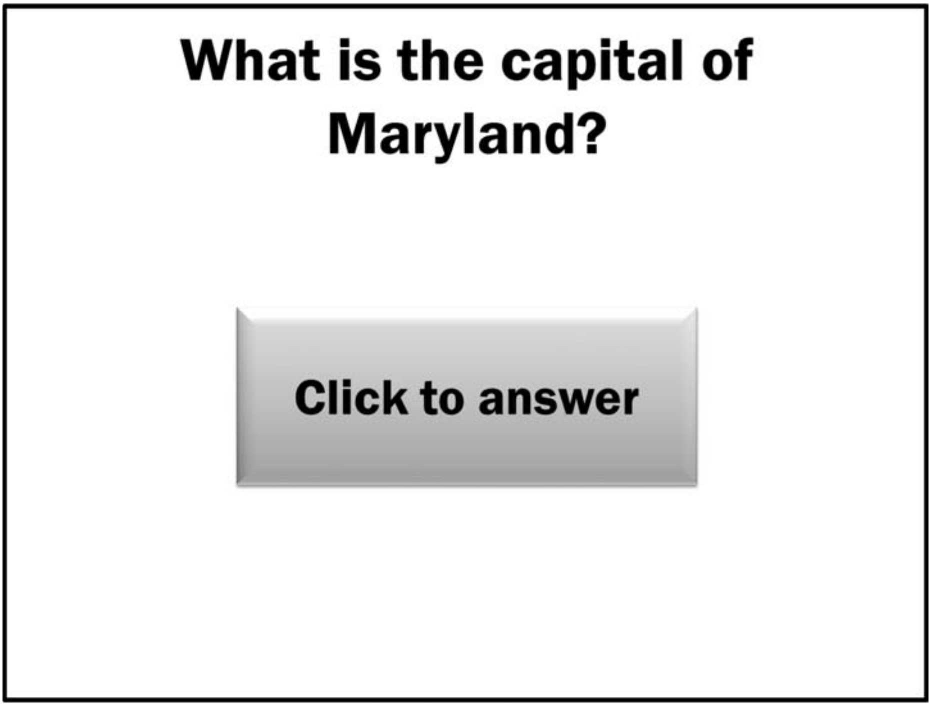
Multiple-choice questions can only take you so far. Sometimes, you want the students to type the answer. We’ll need a special procedure to ask the question and judge the answer:

```
Sub Question3()
   Dim answer As String

   answer = InputBox(prompt:="What is the capital of Maryland?", _
      Title:="Question 3")
   If answer = "Annapolis" Then
      RightAnswer
   Else
      WrongAnswer
   End If
End Sub
```

This procedure uses the variable `answer` to store the answer typed by the student. Because only this procedure needs to know about it, `answer` can be declared inside the procedure (`Dim answer As String`) but it would be fine to declare it at the top of the module as well. Next, we use `InputBox`, just like in the `YourName` procedure, to ask the student to type the answer, which is stored in the variable `answer`.

In our multiple-choice questions, buttons were tied to our `RightAnswer` and `WrongAnswer` procedures. With a short-answer question, we don’t have buttons to call these procedures, so we use an `If` statement. If the answer is right, call the `RightAnswer` procedure; if the answer is wrong, call the `WrongAnswer` procedure.

The last thing you need is a way for the question to be asked. Figure 8.2 shows an example slide. Just connect the “Click to answer” button to the `Question3` (or whatever you call it) procedure, and when the user clicks on the button, the `InputBox` will pop up asking for an answer. The figure shows a button with the words “Click to answer,” but your button can contain the question itself, the word “Question,” a question mark, or whatever else you like as long as the user knows to press the button to get and/or answer the question.



What is the capital of Maryland?

Click to answer

Figure 8.2. Short-Answer Question Slide.

Do Spelling and Spacing Count?

Now we have a short-answer question, but even people who live in Maryland have trouble spelling “Annapolis.” If spelling is important in your quiz, then leave the `Question3` procedure alone. However, you might be tolerant of several mistakes that your students might make, so you might want to be more lenient. You might want to ignore extra spaces, ignore capitalization, and accept alternative spellings.

Spaces before and after the answer can be handled easily with the `Trim` command. Insert the following line after the `InputBox` statement:

```
answer = Trim(answer)
```

This will take the answer that was typed, remove any spaces at the beginning or end, and put the result (without the extra spaces) back into the `answer` variable. `Trim` will turn “ Annapolis ” into “Annapolis.” This will not eliminate any spaces in the middle, so “Ann apolis” will remain “Ann apolis.” If for some reason you only want to remove the spaces before the answer or after the answer, use `LTrim` or `RTrim` respectively (for “left” trim and “right” trim).

If you are not concerned with how your students capitalize their answers, `LCase` can set the answer to lowercase by adding:

```
answer = LCase(answer)
```

This takes the answer that the student typed, converts all capital letters to lowercase letters, and puts the lowercase version back in the variable `answer`. This will change “Annapolis,” “AnNaPolis,” and “AnnApolis” to “annapolis.” If you are testing to make sure the student knows to capitalize the first letter of a city name, don’t use `LCase`.

> Warning!!! The answer is now lowercase. This means that your `If` statement needs to compare it to a lowercase response. `If answer = "Annapolis" Then` will **never** be `True` because “annapolis” is not the same as “Annapolis” and `LCase` changes all capitalizations of “Annapolis” to “annapolis.” So even if the student types “Annapolis,” `LCase` will change it to “annapolis” and mark it wrong when comparing it to “Annapolis.” Instead, you must use `If answer = "annapolis" Then` with the lowercase “a.”

If you are willing to accept alternative spellings or alternative answers, you can test for all the alternatives that you want in your `If` statement:

```
If answer = "annapolis" Or _
   answer = "anapolis" Or _
   answer = "annappolis" Or _
   answer = "anappolis" Then
```

Include as many or as few different alternatives as you like. Just remember that if you used `LCase`, all your alternatives must be lower case.

If we use all our tricks (ignoring extra spaces, accepting any capitalization, and allowing alternative answers), our procedure will look like this:

```
Sub Question3()
   Dim answer As String

   answer = InputBox(prompt:="What is the capital of Maryland?", _
      Title:="Question 3")
   answer = Trim(answer)
   answer = LCase(answer)
   If answer = "annapolis" Or _
      answer = "anapolis" Or _
      answer = "annappolis" Or _
      answer = "anappolis" Then
      RightAnswer
   Else
      WrongAnswer
   End If
End Sub
```

The exact same procedures can be used for any short-answer question. Simply change the `InputBox` statement to include your question and change the `If` statement to include the correct answer(s) for your question.

Bonus Trick: Three Tries

What if your students are stupid? That's a trick question. Our students aren't stupid, but sometimes we ask them questions that they can't answer. With a multiple-choice question, they just have to click on every answer until they get it right so even the hardest question can eventually be answered. With some of the examples, the slides don't move on until the right answer is chosen. This can be a real problem for short-answer questions. Some questions will be too hard for some students, and they will never get the right answer. So, for short-answer questions we need a way to stop the madness and let the student go on. The following is set up to work with an example that lets the student answer until the question is right and uses one `RightAnswer` and one `WrongAnswer` procedure.

```
Dim numCorrect As Integer
Dim numIncorrect As Integer
Dim userName As String
Dim qAnswered As Boolean
Dim triesCount As Integer 'declare triesCount

Sub GetStarted()
   Initialize
   YourName
   ActivePresentation.SlideShowWindow.View.Next
End Sub
```

```
Sub Initialize()
   numCorrect = 0
   numIncorrect = 0
   qAnswered = False
   triesCount = 0 'initialize triesCount
End Sub

Sub YourName()
   userName = InputBox("Type your name")
End Sub

Sub RightAnswer()
   If qAnswered = False Then
      numCorrect = numCorrect + 1
   End If
   qAnswered = False
   MsgBox "You are doing well, " & userName
   triesCount = 0 'reset triesCount for the next question
   ActivePresentation.SlideShowWindow.View.Next
End Sub

Sub WrongAnswer()
   If qAnswered = False Then
      numIncorrect = numIncorrect + 1
   End If
   qAnswered = True
   MsgBox "Try to do better next time, " & userName
   triesCount = triesCount + 1 'Got it wrong one more time
   If triesCount >= 3 Then 'tried 3 times so it is time to move on
      MsgBox "You have tried too many times. Let's move on."
      triesCount = 0 'reset triesCount for the next question
      qAnswered = False 'reset qAnswered for the next question
      ActivePresentation.SlideShowWindow.View.Next
   End If
End Sub

Sub Question3()
   Dim answer As String

   answer = InputBox(prompt:="What is the capital of Maryland?", _
      Title:="Question 3")
   answer = Trim(answer)
   answer = LCase(answer)
   If answer = "annapolis" Or _
      answer = "anapolis" Or _
      answer = "annappolis" Or _
      answer = "anappolis" Then
      RightAnswer
   Else
```

```
      WrongAnswer
   End If
End Sub

Sub Feedback()
   MsgBox "You got " & numCorrect & " out of " _
      & numCorrect + numIncorrect & ", " & userName
End Sub
```

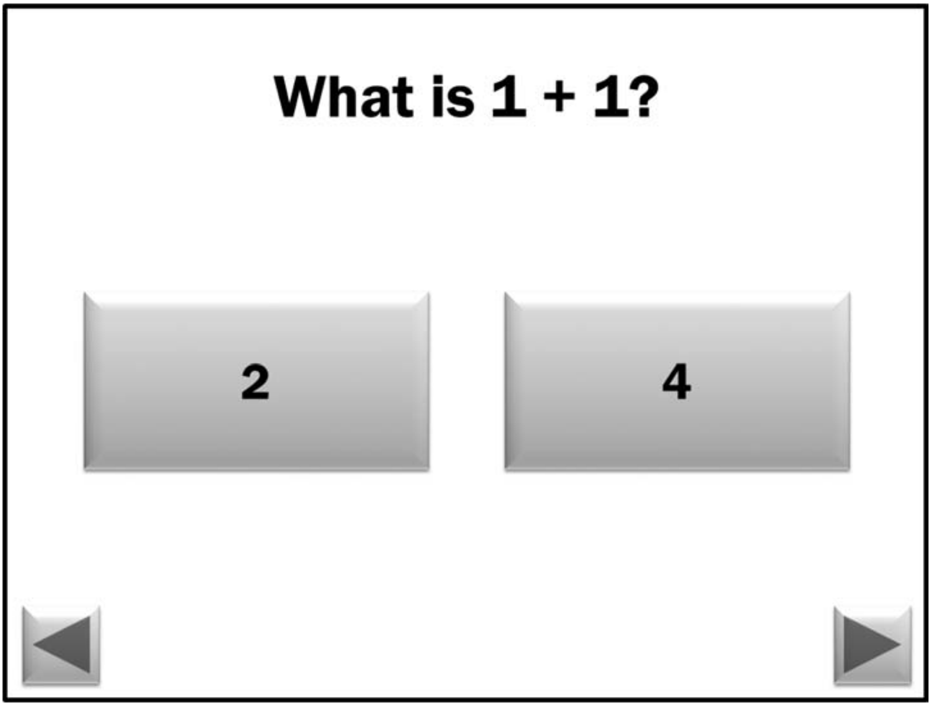
All the key additions for this example have comments. The main thing is the variable `triesCount`. This is declared at the top of the module with the `Dim` statements and initialized to `0` in the `Initialize` procedure. It also needs to be reset to `0` in the `RightAnswer` procedure so it is ready for the next question. The heavy lifting is done in the `WrongAnswer` procedure. Every time the question is answered wrong, we add `1` to `triesCount`. If this is the third (or more) try, it is time to move on, so we must do four things: (1) let the student know that it is time to move on, (2) reset `triesCount` to `0` for the next question, (3) reset `qAnswered` to `False` for the next question, and (4) move to the next question.

Try Again and Again: Answer Again After It's Right

The previous examples work fine as long as your students are forced to move to the next question (and can't come back) once they have gotten the right answer. This gets more complicated if you allow students to come back to questions later. The problem is that we need to keep track of more things; that is, we need variables to remember if each question has been answered: `q1Answered`, `q2Answered`, etc. As you begin to understand this example, you might think of other things that you want to remember. In a later example in this chapter, we will keep track of not only which questions have been answered but also what those answers were. If you want to try to go beyond the examples in this book, remember that you can create as many variables as you want to keep track of as many things as you want.

To allow students to revisit questions as many times as they want, you will have to alter your question slides to include buttons that move to the next and previous slides, as in Figure 8.3.

The other change to your slides will be to tie your right and wrong answer buttons to new procedures for each question. We will need a new procedure for each question's right and wrong answers, rather than one procedure for all right answers and one for all wrong answers. These specialized procedures will check the variables (`q1Answered`, `q2Answered`, . . .) to see if the questions have been answered and will update the variables and the score appropriately.



What is 1 + 1?

Figure 8.3. Question Slide with Next and Previous Buttons

Here is the complete VBA code for this example. Comments have been used to indicate changes from the previous example (without the “Bonus Trick”):

```
Dim numCorrect As Integer
Dim numIncorrect As Integer
Dim userName As String
Dim q1Answered As Boolean 'ADDED to replace qAnswered
Dim q2Answered As Boolean 'ADDED to replace qAnswered

Sub GetStarted()
   Initialize
   YourName
   ActivePresentation.SlideShowWindow.View.Next
End Sub

Sub Initialize()
   numCorrect = 0
   numIncorrect = 0
   q1Answered = False 'ADDED to replace qAnswered
   q2Answered = False 'ADDED to replace qAnswered
End Sub
```

```
Sub YourName()
   userName = InputBox("Type your name")
End Sub

Sub RightAnswer1() 'ADDED to replace RightAnswer
   If q1Answered = False Then
      numCorrect = numCorrect + 1
   End If
   q1Answered = True 'Do not reset q1Answered to FALSE
   MsgBox "You are doing well, " & userName
   'DELETED ActivePresentation.SlideShowWindow.View.Next
End Sub

Sub RightAnswer2() 'Same as RightAnswer1 with 1 changed to 2
   If q2Answered = False Then
      numCorrect = numCorrect + 1
   End If
   q2Answered = True
   MsgBox "You are doing well, " & userName
End Sub

Sub WrongAnswer1() 'ADDED to replace WrongAnswer
   If q1Answered = False Then
      numIncorrect = numIncorrect + 1
   End If
   q1Answered = True
   MsgBox "Try to do better next time, " & userName
End Sub

Sub WrongAnswer2() 'Same as WrongAnswer1 with 1 changed to 2
   If q2Answered = False Then
      numIncorrect = numIncorrect + 1
   End If
   q2Answered = True
   MsgBox "Try to do better next time, " & userName
End Sub

Sub Feedback()
   MsgBox "You got " & numCorrect & " out of " _
      & numCorrect + numIncorrect & ", " & userName
End Sub
```

The most significant additions are the new variables `q1Answered` and `q2Answered` and the special right and wrong answer procedures for each question. The variables keep track of which questions have already been answered. `q1Answered` is `True` if question 1 has been answered, and it is `False` if question 1 has not been answered. `q2Answered` is `True` if question 2 has been answered, and it is `False` if question 2 has not been answered. If you have more than two questions, you need a `q3Answered`, `q4Answered`, etc.; that is, you need one variable for each question. These variables are declared at the beginning with the `Dim` statements:

```
Dim q1Answered As Boolean
Dim q2Answered As Boolean
```

Then, in `Initialize` they are initialized (set to `False` because none of the questions have been answered yet):

```
q1Answered = False
q2Answered = False
```

Remember that if you have more questions, you need to repeat both of these sets of statements for each additional variable.

Next, we need our specialized `RightAnswer` and `WrongAnswer` procedures. `RightAnswer1` is tied to the right answer button for question 1. `WrongAnswer1` is tied to the wrong answer button(s) for question 1. `RightAnswer2` and `WrongAnswer2` are for question 2. And, if we had more questions, `RightAnswer3` and `WrongAnswer3` would be for question 3; `RightAnswer4` and `WrongAnswer4` would be for question 4; etc.

These procedures simply check the appropriate variable to see if the question has been answered. If it hasn't (`If q1Answered = False Then`), we update the score (`numCorrect = numCorrect + 1` or `numIncorrect = numIncorrect + 1`). Regardless of whether or not it has been answered before, we set the variable to `True` (e.g., `q1Answered = True` for question 1) and give the appropriate feedback with a `MsgBox`.

Bonus trick: With what you learned in Chapter 7, you should be able to easily add a shape (perhaps a checkmark or a text box with the word "Answered" in it) to each slide to let the students know if they have answered the question yet. Simply add your shape to each slide (hint: add it to one slide and copy it to the other slides) and name it something like "answered." In `Initialize`, put a line to hide each of the "answered" shapes:

```
ActivePresentation.Slides(2).Shapes("answered").Visible = False
ActivePresentation.Slides(3).Shapes("answered").Visible = False
```

Then, in each `RightAnswer` and `WrongAnswer` procedure, put a line to show the shape on the current slide:

```
ActivePresentation.SlideShowWindow.View.Slide _
   .Shapes("answered").Visible = True
```

As a bonus exercise, try setting up two shapes on each question slide: a green checkmark for the right answer and a red X for the wrong answer. Have this appear when the student answers the question for the first time (hint: be sure to put the code to show the shape between the `If q2Answered = False Then` and the `End If`).

If you have a short-answer question, the only change is to call the specialized `RightAnswer` and `WrongAnswer` procedures from the `Question` procedure:

```
Sub Question3()
   Dim answer As String

   answer = InputBox(prompt:="What is the capital of Maryland?", _
      Title:="Question 3")
   answer = Trim(answer)
   answer = LCase(answer)
   If answer = "annapolis" Or _
      answer = "anapolis" Or _
      answer = "annappolis" Or _
      answer = "anappolis" Then
      RightAnswer3 'Changed from RightAnswer to RightAnswer3
   Else
      WrongAnswer3 'Changed from WrongAnswer to WrongAnswer3
   End If
End Sub
```

How Did You Do: Reporting Results to the Teacher

The previous examples concentrated on giving feedback to students by telling them which questions they got right and wrong and what their score is at the end. In this section, you will learn a trick to have your students report results to you. One method of reporting that information is to create a results slide that can be printed. We'll extend the previous examples in two ways to do this:

1. Instead of using a `MsgBox` to announce the results, we will create a slide that announces the results. The slide will include a button for printing.

2. We will keep track of not only right and wrong answers but specifically what the answer was that was clicked or typed. This will allow our results page to print a list of answers that were given.

The most significant changes to the code are related directly to our two extensions:

1. We will add the procedures `PrintablePage` to create the slide with the results, `PrintResults` to print the results on the printer, and `StartAgain` to delete the results slide and go back to the beginning.
2. We will add variables to keep track of which answers were selected first. For this example, we will use the three questions from the previous example so we will have three variables: `answer1`, `answer2`, and `answer3`. These variables will be used to print the students' answers on the printable page.

Here is the complete code (new lines and procedures are indicated by the comment `'ADDED`):

```
Dim numCorrect As Integer
Dim numIncorrect As Integer
Dim userName As String
Dim q1Answered As Boolean
Dim q2Answered As Boolean
Dim q3Answered As Boolean
Dim answer1 As String 'ADDED
Dim answer2 As String 'ADDED
Dim answer3 As String 'ADDED
Dim printableSlideNum As Long 'ADDED

Sub GetStarted()
   Initialize
   YourName
   ActivePresentation.SlideShowWindow.View.Next
End Sub

Sub Initialize()
   numCorrect = 0
   numIncorrect = 0
   q1Answered = False
   q2Answered = False
   q3Answered = False
   answer1 = ""'ADDED
   answer2 = ""'ADDED
   answer3 = ""'ADDED
   printableSlideNum = ActivePresentation.Slides.Count + 1 'ADDED
End Sub
```

```
Sub YourName()
   userName = InputBox("What is your name?")
End Sub

Sub Answer1GeorgeWashington()
   If q1Answered = False Then
      numCorrect = numCorrect + 1
      answer1 = "George Washington" 'ADDED
   End If
   q1Answered = True
   MsgBox "You are doing well, " & userName
   ActivePresentation.SlideShowWindow.View.Next
End Sub

Sub Answer1AbrahamLincoln()
   If q1Answered = False Then
      numIncorrect = numIncorrect + 1
      answer1 = "Abraham Lincoln" 'ADDED
   End If
   q1Answered = True
   MsgBox "Try to do better next time, " & userName
End Sub

Sub Answer2Two()
   If q2Answered = False Then
      numCorrect = numCorrect + 1
      answer2 = "2" 'ADDED
   End If
   q2Answered = True
   MsgBox "You are doing well, " & userName
   ActivePresentation.SlideShowWindow.View.Next
End Sub

Sub Answer2Four()
   If q2Answered = False Then
      numIncorrect = numIncorrect + 1
      answer2 = "4"
   End If
   q2Answered = True
   MsgBox "Try to do better next time, " & userName
End Sub
```

```
Sub Question3()
   Dim answer

   answer = InputBox(prompt:="What is the capital of Maryland?", _
      Title:="Question 3")
   If q3Answered = False Then 'ADDED
      answer3 = answer 'ADDED
   End If 'ADDED
   answer = Trim(answer)
   answer = LCase(answer)
   If answer = "annapolis" Then
      RightAnswer3
   Else
      WrongAnswer3
   End If
End Sub

Sub RightAnswer3()
   If q3Answered = False Then
      numCorrect = numCorrect + 1
   End If
   q3Answered = True
   MsgBox "You are doing well, " & userName
   ActivePresentation.SlideShowWindow.View.Next
End Sub

Sub WrongAnswer3()
   If q3Answered = False Then
      numIncorrect = numIncorrect + 1
   End If
   q3Answered = True
   MsgBox "Try to do better next time, " & userName
End Sub

Sub PrintablePage() 'ADDED
   Dim printableSlide As Slide
   Dim homeButton As Shape
   Dim printButton As Shape

   Set printableSlide = _
      ActivePresentation.Slides.Add(Index:=printableSlideNum, _
      Layout:=ppLayoutText)
   printableSlide.Shapes(1).TextFrame.TextRange.Text = _
      "Results for " & userName
   printableSlide.Shapes(2).TextFrame.TextRange.Text = _
      "Your Answers" & Chr$(13) & _
      "Question 1: " & answer1 & Chr$(13) & _
      "Question 2: " & answer2 & Chr$(13) & _
      "Question 3: " & answer3 & Chr$(13) & _
      "You got " & numCorrect & " out of " & _
      numCorrect + numIncorrect & "." & Chr$(13) & _
      "Press the Print Results button to print your answers."
   Set homeButton = _
      ActivePresentation.Slides(printableSlideNum).Shapes.AddShape _
      (msoShapeActionButtonCustom, 0, 0, 150, 50)
   homeButton.TextFrame.TextRange.Text = "Start Again"
   homeButton.ActionSettings(ppMouseClick).Action = ppActionRunMacro
   homeButton.ActionSettings(ppMouseClick).Run = "StartAgain"
   Set printButton = _
      ActivePresentation.Slides(printableSlideNum).Shapes.AddShape _
      (msoShapeActionButtonCustom, 200, 0, 150, 50)
   printButton.TextFrame.TextRange.Text = "Print Results"
   printButton.ActionSettings(ppMouseClick).Action = ppActionRunMacro
   printButton.ActionSettings(ppMouseClick).Run = "PrintResults"
   ActivePresentation.SlideShowWindow.View.Next
   ActivePresentation.Saved = True
End Sub

Sub PrintResults() 'ADDED
   ActivePresentation.PrintOptions.OutputType = ppPrintOutputSlides
   ActivePresentation.PrintOut From:=printableSlideNum, _
      To:=printableSlideNum
End Sub

Sub StartAgain() 'ADDED
   ActivePresentation.SlideShowWindow.View.GotoSlide 1
   ActivePresentation.Slides(printableSlideNum).Delete
   ActivePresentation.Saved = True
End Sub
```

The most important thing you need to know about this script is how to add more questions. If you understand the following explanation of the script, that is great, and you will have a better ability to change aspects of the script. But if you don't understand the script, you can still add questions. Almost everything you need to do to add questions is the same as in previous sections:

- You will need another `RightAnswer` and `WrongAnswer` procedure for each new question. Note that in the earlier examples, for multiple-choice questions, these procedures would be named `RightAnswer4` and `WrongAnswer4`, `RightAnswer5` and `WrongAnswer5`, etc. In this example our procedures are more specific because the `answer1`, `answer2`, and `answer3` variables must be set to the chosen answers. That is why you need a procedure for each answer. Just follow the examples of `Answer1GeorgeWashington` and

Answer1AbrahamLincoln for right and wrong answers respectively. Note that in this example we have added ActivePresentation.SlideShowWindow.View.Next to our RightAnswer procedures so the presentation automatically goes to the next slide after a correct answer. Leave this out (just like in the previous example) if you want students to stay on the slide until they choose to go forward.

- You will need another Question procedure for every short-answer question (e.g., Question5 or Question17).
- You will need another qAnswered and answer variable (declared with a Dim statement and initialized in the Initialize procedure) for each new question (i.e., q4Answered and answer4, q5Answered and answer5, etc.).
- You will need to add a line to the PrintablePage procedure to include the results for each new question (e.g., "Question 4: " & answer4 & Chr$(13) & _).
- You will need to add the slides with the questions you are adding, tying the buttons to the appropriate right and wrong answer procedures or the Question procedure for a short-answer question.

As a scripter, you do not need to understand the code to be able to use it. If you can follow the earlier steps to add your own questions, you are in good shape. If you want to understand the code, read on.

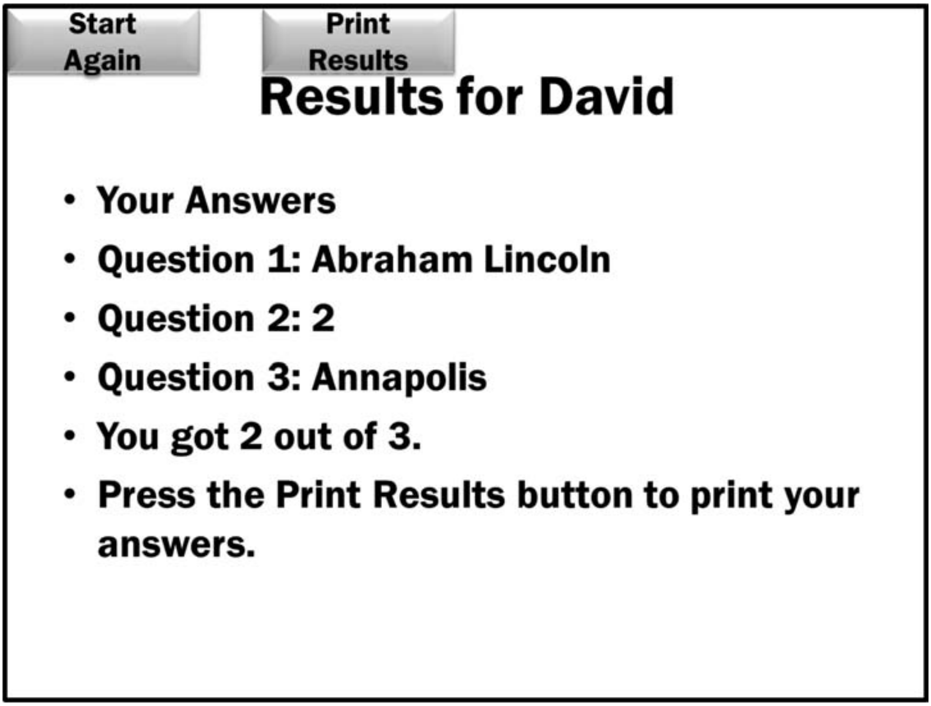
Keeping track of the answers in answer1, answer2, and answer3 is fairly simple: the answers are set to the empty string (a set of quotes with nothing in between) in the Initialize procedure and the first time a question is answered, the answer variables are set to whatever was chosen or typed. Inserting a new page for printing and printing it is more complicated. Because we are going to add a slide, we need to know which slide number to add. This is done with the variable printablePageNum. In our Initialize procedure, we set this variable to one more than the total number of slides that we have (i.e., if we have six slides, this will be set to 7 because the slide we are going to add will be the seventh slide):

```
printableSlideNum = ActivePresentation.Slides.Count + 1
```

The PrintablePage procedure creates the page. Figure 8.4 shows an example of this slide.

The following line creates a slide and stores it in the variable printableSlide:

```
Set printableSlide = _
   ActivePresentation.Slides.Add(Index:=printableSlideNum, _
   Layout:=ppLayoutText)
```



Results for David

- Your Answers
- Question 1: Abraham Lincoln
- Question 2: 2
- Question 3: Annapolis
- You got 2 out of 3.
- Press the Print Results button to print your answers.

Figure 8.4. Example of Printable Slide

`Index:=printableSlideNum` creates a new slide after the last slide. `Layout:=ppLayoutText` makes the slide a normal Title and Text slide with two text areas: (1) a title area and (2) a bulleted list area. The following lines set the text in those areas (this is where you would add the answers for more questions):

```
printableSlide.Shapes(1).TextFrame.TextRange.Text = _
   "Results for " & userName
printableSlide.Shapes(2).TextFrame.TextRange.Text = _
   "Your Answers" & Chr$(13) & _
   "Question 1: " & answer1 & Chr$(13) & _
   "Question 2: " & answer2 & Chr$(13) & _
   "Question 3: " & answer3 & Chr$(13) & _
   "You got " & numCorrect & " out of " & _
   numCorrect + numIncorrect & "." & Chr$(13) & _
   "Press the Print Results button to print your answers."
```

`printableSlide.Shapes(1)` refers to the title area of the slide, and `printableSlide.Shapes(2)` refers to the bulleted list area of the slide. Normally, we use shape names instead of numbers, but because we just added the slide with these shapes, we can be sure of the numbers for those shapes.

Notice that these are two big long lines. Underscores are used at the end of each part of the line to indicate that they are really long lines broken up to avoid wrapping problems. If you wanted to add more questions, you would need to slip in Question 4, Question 5, etc. into the second line with the appropriate underscores:

```
printableSlide.Shapes(2).TextFrame.TextRange.Text = _
   "Your Answers" & Chr$(13) & _
   "Question 1: " & answer1 & Chr$(13) & _
   "Question 2: " & answer2 & Chr$(13) & _
   "Question 3: " & answer3 & Chr$(13) & _
   "Question 4: " & answer4 & Chr$(13) & _
   "Question 5: " & answer5 & Chr$(13) & _
   "You got " & numCorrect & " out of " & _
   numCorrect + numIncorrect & "." & Chr$(13) & _
   "Press the Print Results button to print your answers."
```

Bonus trick: Note that if you have several questions, you might want to play with formatting the display of your answers, possibly using a two-column text slide (`ppLayoutTwoColumnText` instead of `ppLayoutText` and putting some text in shape 2 and other text in shape 3):

```
Set printableSlide = _
   ActivePresentation.Slides.Add(Index:=printableSlideNum, _
   Layout:=ppLayoutTwoColumnText)
printableSlide.Shapes(1).TextFrame.TextRange.Text = _
   "Results for " & userName
printableSlide.Shapes(2).TextFrame.TextRange.Text = _
   "Your Answers" & Chr$(13) & _
   "Question 1: " & answer1 & Chr$(13) & _
   "Question 2: " & answer2 & Chr$(13) & _
   "Question 3: " & answer3 & Chr$(13)
printableSlide.Shapes(3).TextFrame.TextRange.Text = _
   "Question 4: " & answer4 & Chr$(13) & _
   "Question 5: " & answer5 & Chr$(13) & _
   "You got " & numCorrect & " out of " & _
   numCorrect + numIncorrect & "." & Chr$(13) & _
   "Press the Print Results button to print your answers."
```

You might also want to adjust the font size of the text area by putting the following line after the previous code:

```
printableSlide.Shapes(2).TextFrame.TextRange.Font.Size = 9
```

9 is the size of the font, so you can choose a different number for a smaller or larger font. Note that some versions of PowerPoint automatically change the font size for you so your text fits the text box.

Next we need to add buttons to our new slide. The following line adds a custom button in the top left of the screen (coordinates 0,0) that is 150 pixels wide and 50 pixels tall. A custom button has no icon in it.

```
Set homeButton = _
   ActivePresentation.Slides(printableSlideNum).Shapes.AddShape _
   (msoShapeActionButtonCustom, 0, 0, 150, 50)
```

Because we stored the button in the variable homeButton, we can use that variable to change the attributes of the button. We need to put some text in the button. The text "Start Again" will appear in the button:

```
homeButton.TextFrame.TextRange.Text = "Start Again"
```

Then we make the button clickable and assign a procedure (in this case, the StartAgain procedure) to the button:

```
homeButton.ActionSettings(ppMouseClick).Action = ppActionRunMacro
homeButton.ActionSettings(ppMouseClick).Run = "StartAgain"
```

The code for the Print Results button is almost identical, so if you understood the earlier code you don't need any explanation for the Print Results button.

Finally, we want to go to the slide (ActivePresentation.SlideShow-Window.View.Next) that we just created and fool PowerPoint into thinking that the presentation does not need to be saved (ActivePresentation.Saved = True—see "Saving and Quitting" in Chapter 9 for more information about this line).

The PrintResults procedure has two lines:

```
ActivePresentation.PrintOptions.OutputType = ppPrintOutputSlides
ActivePresentation.PrintOut From:=printableSlideNum, _
   To:=printableSlideNum
```

The first line makes sure that PowerPoint knows it is going to print one slide per page. The second line actually prints the single slide that we just created. If our printable slide is slide number 6 (and thus printableSlideNum is 6), that line says to print from slide 6 to 6.

The last procedure is StartAgain. This simply goes to the first slide, deletes the slide that was just printed (ActivePresentation.Slides(printableSlideNum).Delete), and makes sure that PowerPoint doesn't ask you to save.

You might want to know what buttons will be tied to the last three procedures. PrintablePage, instead of the Feedback procedure from earlier examples, will be tied to the "How Did I Do" button. But what about the last two procedures? That is a trick question. You don't tie them to any buttons. We have used VBA to create the buttons and tie them to procedures as part of the PrintablePage procedure. Creation of the buttons and tying them to procedures is taken care of automatically.

Bonus trick: What if you wanted to collect information and not keep score? That's easy. The PrintablePage procedure is identical except you don't need the text that tells you what the score is. The part that shows the results might look like this:

```
printableSlide.Shapes(2).TextFrame.TextRange.Text = _
   "Your Answers" & Chr$(13) & _
   "Question 1: " & answer1 & Chr$(13) & _
   "Question 2: " & answer2 & Chr$(13) & _
   "Question 3: " & answer3 & Chr$(13) & _
   "Press the Print Results button to print your answers."
```

Then anything that relates to keeping score could be deleted, leaving only the part that keeps track of which answer was chosen. For example, for a multiple-choice question, you might have:

```
Sub Answer2Two()
   answer2 = "2" 'ADDED
   MsgBox "Thank you for response, " & userName
   ActivePresentation.SlideShowWindow.View.Next
End Sub
```

For short-answer questions, you might have:

```
Sub Question3()
   answer3 = InputBox(Prompt:="What is your favorite color?", _
      Title:="Question 3")
   ActivePresentation.SlideShowWindow.View.Next
End Sub
```

These procedures just collect the information and move on to the next question without judgment or scorekeeping.

Learn First, Ask Questions Later: The Tutorial and Quiz

This chapter has explained several ways to create tests and quizzes. Now we are going to add a tutorial to our presentation. You could do this easily by creating some slides with some information that precede your quiz slides. If each information slide has a button to move forward, students are forced to go through the information slides before reaching the quiz.

This works very well for a simple, linear tutorial. What if your tutorial is more complex? What if your tutorial has several parts, each of which can be reached by a menu? That is not a problem. Simply put buttons on your menu slide for each part of the tutorial, and put a button for your quiz on the menu slide as well.

This leaves you with two problems: getting lost in hyperspace and forcing your students to go through the tutorial before taking the quiz. We'll deal with these issues one at a time.

Lost in Hyperspace: Where Have I Been?

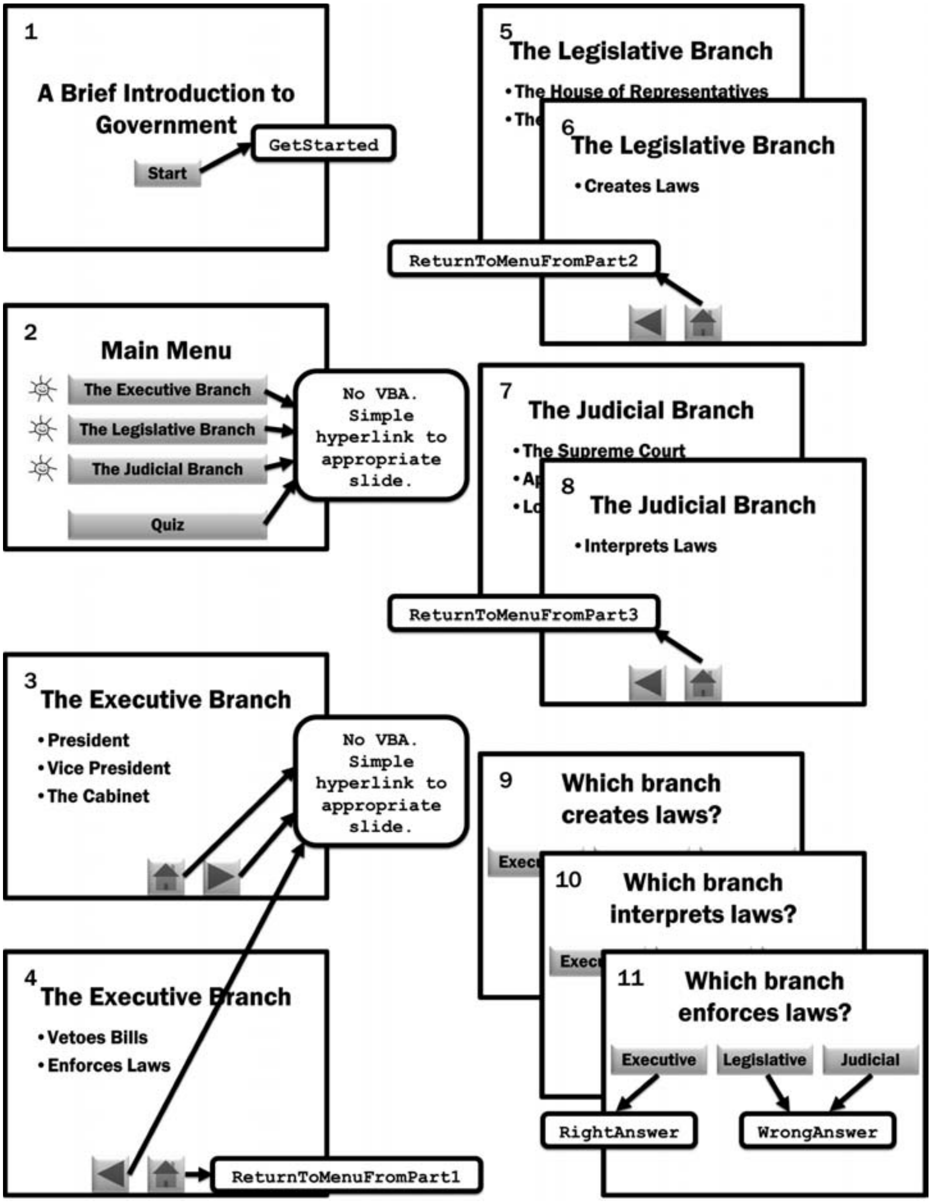
In a linear tutorial—that is, one where you force the student to go from one slide to the next to the next—there is no problem with getting lost. Once you allow the student choices about where to go, getting lost is an important concern. That can happen when users don't know where they are, where they are going, where they have been, and how to get where they want to go. In the real world, there are landmarks and street signs to help you get around. Computer screens are often missing those things. Even something as simple as a tutorial with sections linked by a menu can get confusing. The most confusing part of a menu is knowing where you have been: "Did I already do section 2 and section 3 or section 3 and section 4?" One solution to this is to leave some indication in the menu about where the user has been.

There are many ways to do this. One thing that you have probably seen in your Web browser is that it changes the color of visited links: A blue link to another Web page turns purple after you have followed that link. If your menus are all text, PowerPoint will do this automatically for you (although the results might not be exactly what you want). If you use buttons for your menu, one solution is to turn the buttons a different color. For example, you can change the color of the shape named "Multiplication Button" on the slide named "Menu" to magenta with:

```
ActivePresentation.Slides("Menu").Shapes("Multiplication Button") _
   .Fill.ForeColor.RGB = vbMagenta
```

Another possibility is to indicate that a menu item has been visited by putting a symbol next to it, such as a check mark or a smiley face. You might create a tutorial and quiz like the one shown in Figure 8.5. This simple tutorial has three parts:

The Executive Branch, The Legislative Branch, and The Judicial Branch. Students may choose these parts of the tutorial in any order. Smiling sunshines next to the buttons indicate those sections of the tutorial that have already been completed. The smiling sunshines (or whatever symbols or pictures you like) can be created with any traditional PowerPoint tools (drawing, clip art, inserting a picture, etc.).



1

A Brief Introduction to Government

Start

GetStarted

2

Main Menu

The Executive Branch

The Legislative Branch

The Judicial Branch

Quiz

No VBA. Simple hyperlink to appropriate slide.

3

The Executive Branch

- President
- Vice President
- The Cabinet

No VBA. Simple hyperlink to appropriate slide.

4

The Executive Branch

- Vetoes Bills
- Enforces Laws

ReturnToMenuFromPart1

5

The Legislative Branch

- The House of Representatives
- Th

6

The Legislative Branch

- Creates Laws

ReturnToMenuFromPart2

7

The Judicial Branch

- The Supreme Court
- Ap
- Lo

8

The Judicial Branch

- Interprets Laws

ReturnToMenuFromPart3

9

Which branch creates laws?

Exec

10

Which branch interprets laws?

Exec

11

Which branch enforces laws?

Executive

Legislative

Judicial

RightAnswer

WrongAnswer

Figure 8.5. Example Tutorial and Quiz PowerPoint Slides

In the figure, slide numbers are shown in the upper left corner of the slide, and the boxes indicate which procedures are tied to which buttons. Notice in the figure that some of the buttons do not use VBA; they use traditional PowerPoint hyperlinks. Figure 8.6 shows the VBA code. Note that the quiz portion of this example is fairly simple (it doesn't keep score), but you can use any of the examples from this chapter and plug the code into the `Initialize` procedure (add that code to earlier `Initialize` procedures; never create two separate `Initialize` procedures) and add the `ReturnToMenuFromPart1`, `ReturnToMenuFromPart2`, `ReturnToMenuFromPart3`, and `JumpToMenu` procedures from Figure 8.6.

The important parts of this example are the "Smile" shapes on slide 2 (the menu slide, which is named "Menu"). These are the smiling sunshine pictures that indicate that a section of the tutorial has been completed. I have used the Selection Pane to name these shapes: "Executive Smile," "Legislative Smile," and "Judicial Smile."

As the shapes are the important parts, all but one of the new procedures deal with the shapes. The three lines in the `Initialize` procedure hide the shapes so that when the student reaches the menu for the first time, the shapes are hidden:

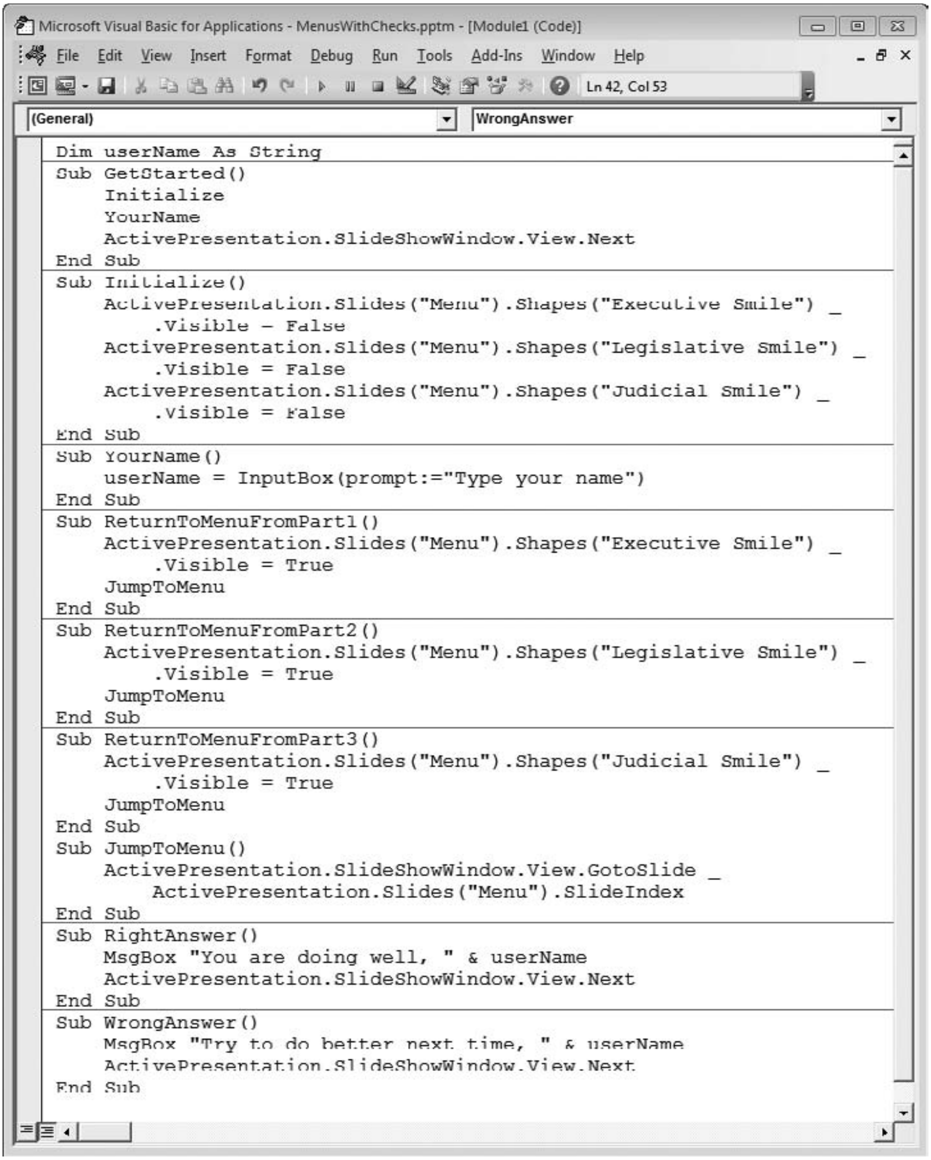
```
ActivePresentation.Slides("Menu").Shapes("Executive Smile") _
   .Visible = False
ActivePresentation.Slides("Menu").Shapes("Legislative Smile") _
   .Visible = False
ActivePresentation.Slides("Menu").Shapes("Judicial Smile") _
   .Visible = False
```

If you find it easier to use numbers for the menu slide (2) and the shapes (6, 7, and 8) in my case, you can do that instead of names.

Next we need to show the shapes at the appropriate time. They will be shown when clicking on the button that returns from each part of the tutorial. The three `ReturnFromMenuFromPart` procedures show the appropriate shape with these lines:

```
ActivePresentation.Slides("Menu").Shapes("Executive Smile") _
   .Visible = True
ActivePresentation.Slides("Menu").Shapes("Legislative Smile") _
   .Visible = True
ActivePresentation.Slides("Menu").Shapes("Judicial Smile") _
   .Visible = True
```

and use `JumpToMenu` to return to the menu slide. `JumpToMenu` would be simpler with just the slide number (2), but it wouldn't work if you decided to move the menu slide to another location.


Microsoft Visual Basic for Applications - MenusWithChecks.pptm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Ln 42, Col 53
(General)
WrongAnswer

```
Dim userName As String
Sub GetStarted()
    Initialize
    YourName
    ActivePresentation.SlideShowWindow.View.Next
End Sub
Sub Initialize()
    ActivePresentation.Slides("Menu").Shapes("Executive Smile") _
        .Visible = False
    ActivePresentation.Slides("Menu").Shapes("Legislative Smile") _
        .Visible = False
    ActivePresentation.Slides("Menu").Shapes("Judicial Smile") _
        .Visible = False
End Sub
Sub YourName()
    userName = InputBox(prompt:="Type your name")
End Sub
Sub ReturnToMenuFromPart1()
    ActivePresentation.Slides("Menu").Shapes("Executive Smile") _
        .Visible = True
    JumpToMenu
End Sub
Sub ReturnToMenuFromPart2()
    ActivePresentation.Slides("Menu").Shapes("Legislative Smile") _
        .Visible = True
    JumpToMenu
End Sub
Sub ReturnToMenuFromPart3()
    ActivePresentation.Slides("Menu").Shapes("Judicial Smile") _
        .Visible = True
    JumpToMenu
End Sub
Sub JumpToMenu()
    ActivePresentation.SlideShowWindow.View.GotoSlide _
        ActivePresentation.Slides("Menu").SlideIndex
End Sub
Sub RightAnswer()
    MsgBox "You are doing well, " & userName
    ActivePresentation.SlideShowWindow.View.Next
End Sub
Sub WrongAnswer()
    MsgBox "Try to do better next time, " & userName
    ActivePresentation.SlideShowWindow.View.Next
End Sub
```

Figure 8.6. VBA Code for Menus with Feedback in Tutorial and Quiz

If you prefer to change the color of your buttons instead of showing a goofy icon, you can do that with a very small change to the previous code. In the `Initialize` procedure, instead of hiding objects, we can set the color of our menu buttons to blue, for example:

```
ActivePresentation.Slides("Menu").Shapes("Executive Button") _
   .Fill.ForeColor.RGB = vbBlue
```

```
ActivePresentation.Slides("Menu").Shapes("Legislative Button") _
   .Fill.ForeColor.RGB = vbBlue
ActivePresentation.Slides("Menu").Shapes("Judicial Button") _
   .Fill.ForeColor.RGB = vbBlue
```

Note that the shapes names are the names of the buttons because we want to change the color of the buttons and won't need the icons. In our ReturnFromMenuFromPart procedures, we need to change the color of the buttons to a different color, using lines like the following:

```
ActivePresentation.Slides("Menu").Shapes("Executive Button") _
   .Fill.ForeColor.RGB = vbMagenta
```

Now that your students know where they have been, in the next section, we will add a few lines so they have to complete the tutorial before taking the quiz.

Hide the Quiz Button

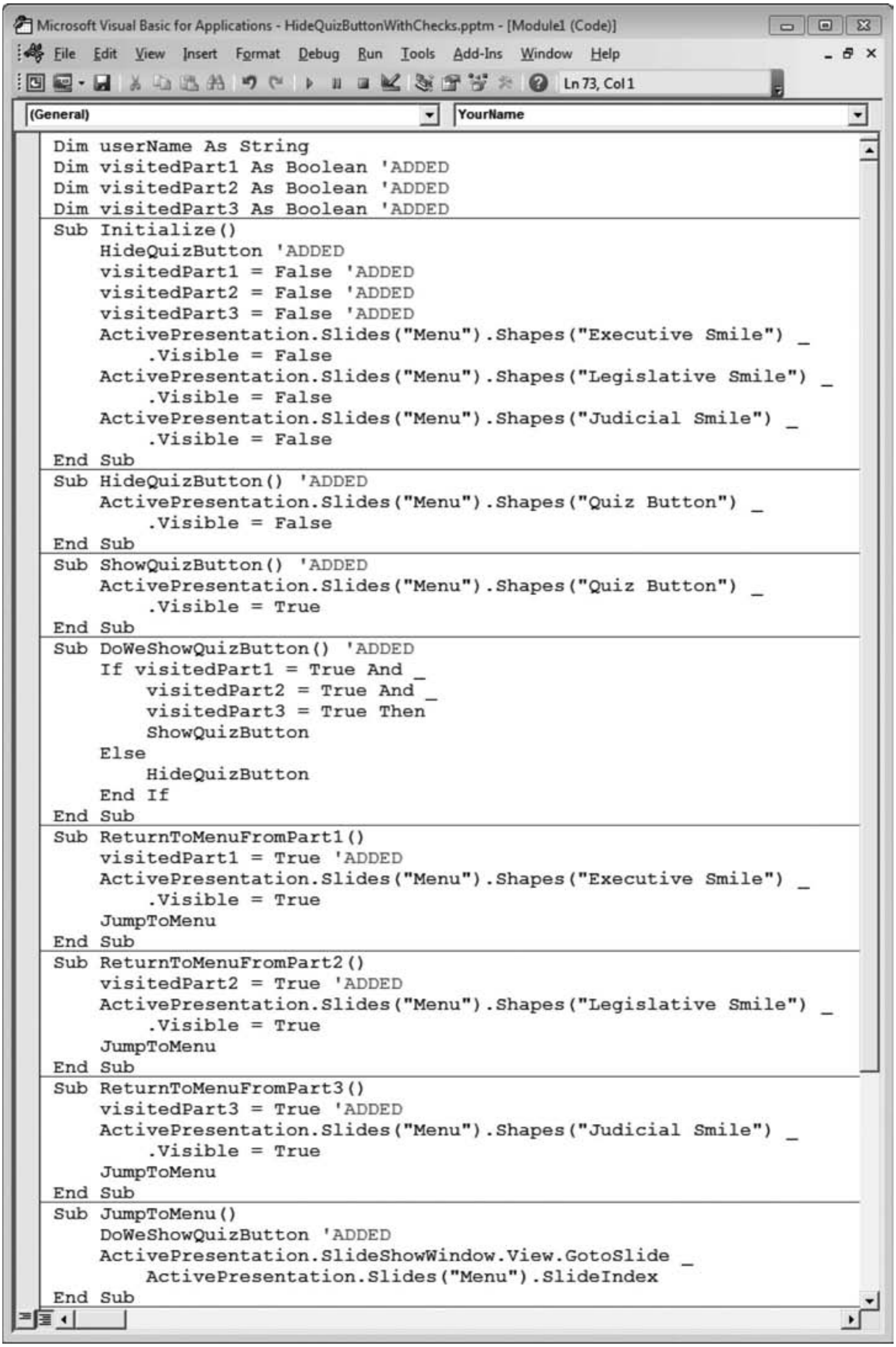
With a button on the menu slide, your students can choose to take the quiz whenever they want. Sometimes this is appropriate; sometimes it is not. For those times when you want your students to complete the tutorial before taking the quiz, we will combine variables (to keep track of what the students have done) with hiding and showing objects (see "Hiding and Showing PowerPoint Objects" in Chapter 7). We will hide the Quiz button on the menu slide until all sections of our tutorial have been visited. Use the code in Figure 8.7 to do this. Lines and procedures noted with the comment 'ADDED have been added to the code from the previous example.

Note that this figure does not include the GetStarted, YourName, RightAnswer, and WrongAnswer procedures. Either use the simple ones from the previous example (see Figure 8.6, p. 149) or use more complicated quizzes from other examples in this chapter.

If you are adding onto the previous example, all you need to change is the VBA; all the buttons are tied to the same procedures. If you are starting with a new file, use Figure 8.5 (p. 147) to guide you in creating the PowerPoint slides and tying the buttons to procedures.

The variables visitedPart1, visitedPart2, and visitedPart3 are the keys to this example. They tell us whether the student has completed each part of the tutorial. They are set to False in the Initialize procedure because no part of the tutorial has been completed. They are set to True in the ReturnToMenuFromPart procedures to indicate when each part of the tutorial has been completed.

Finally, three new procedures have been added: HideQuizButton, ShowQuizButton, and DoWeShowQuizButton. In my example, I named the quiz button "Quiz Button" (naming things in consistent ways that make sense is


Microsoft Visual Basic for Applications - HideQuizButtonWithChecks.pptm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Ln 73, Col 1
(General)
YourName

```
Dim userName As String
Dim visitedPart1 As Boolean 'ADDED
Dim visitedPart2 As Boolean 'ADDED
Dim visitedPart3 As Boolean 'ADDED
Sub Initialize()
    HideQuizButton 'ADDED
    visitedPart1 = False 'ADDED
    visitedPart2 = False 'ADDED
    visitedPart3 = False 'ADDED
    ActivePresentation.Slides("Menu").Shapes("Executive Smile") _
        .Visible = False
    ActivePresentation.Slides("Menu").Shapes("Legislative Smile") _
        .Visible = False
    ActivePresentation.Slides("Menu").Shapes("Judicial Smile") _
        .Visible = False
End Sub
Sub HideQuizButton() 'ADDED
    ActivePresentation.Slides("Menu").Shapes("Quiz Button") _
        .Visible = False
End Sub
Sub ShowQuizButton() 'ADDED
    ActivePresentation.Slides("Menu").Shapes("Quiz Button") _
        .Visible = True
End Sub
Sub DoWeShowQuizButton() 'ADDED
    If visitedPart1 = True And _
        visitedPart2 = True And _
        visitedPart3 = True Then
        ShowQuizButton
    Else
        HideQuizButton
    End If
End Sub
Sub ReturnToMenuFromPart1()
    visitedPart1 = True 'ADDED
    ActivePresentation.Slides("Menu").Shapes("Executive Smile") _
        .Visible = True
    JumpToMenu
End Sub
Sub ReturnToMenuFromPart2()
    visitedPart2 = True 'ADDED
    ActivePresentation.Slides("Menu").Shapes("Legislative Smile") _
        .Visible = True
    JumpToMenu
End Sub
Sub ReturnToMenuFromPart3()
    visitedPart3 = True 'ADDED
    ActivePresentation.Slides("Menu").Shapes("Judicial Smile") _
        .Visible = True
    JumpToMenu
End Sub
Sub JumpToMenu()
    DoWeShowQuizButton 'ADDED
    ActivePresentation.SlideShowWindow.View.GotoSlide _
        ActivePresentation.Slides("Menu").SlideIndex
End Sub
```

Figure 8.7. VBA Code to Hide and Show the Quiz Button

good scripting practice) on the menu slide (named “Menu”) so I can hide it in HideQuizButton with

```
ActivePresentation.Slides("Menu").Shapes("Quiz Button") _
   .Visible = False
```

Change False to True to show it. Also note that the quiz button should be hidden at the beginning, so HideQuizButton is added to Initialize.

DoWeShowQuizButton asks a three-part question: Is part 1 of the tutorial completed, is part 2 of the tutorial completed, and is part 3 of the tutorial completed? If all three parts have been completed—(visitedPart1, visitedPart2, and visitedPart3 have each been set to True)—then we show the quiz button. If any part has not been completed (any visitedPart is not True), then we hide the quiz button.

If your tutorial has more parts, you will need to do the following:

- Add more variables, such as visitedPart4 and visitdPart5, and declare them with Dim statements.
- Initialize the added variables in the Initialize procedure, with lines like visitedPart4 = False.
- Add more procedures (such as ReturnToMenuFromPart4 and ReturnToMenuFromPart5) to return to the menu from the added parts of the tutorial. Be sure to tie the menu buttons to those parts of the tutorial.
- Add more parts to the If question in DoWeShowQuizButton. For example:

```
If visitedPart1 = True And _
   visitedPart2 = True And _
   visitedPart3 = True And _
   visitedPart4 = True And _
   visitedPart5 = True Then
```

- Add more smiling sunshine pictures next to the additional menu buttons. Hide them in the Initialize procedure and show them in the additional ReturnToMenuFromPart procedures.

Of course, this same structure does not need to be used for a tutorial and quiz; it could be used for anything with several parts. If you want your students to complete certain parts before completing some other parts, you can use exactly the same code.

Conclusion

You now have seen several examples of ways to create tutorials and quizzes. You can create different kinds of questions and keep and report scores in different ways. In the next chapter, you will learn a few more scripting tricks and get some more explanation about some programming structures.

Exercises to Try

- Create your own multiple-choice quiz with your own questions and answers. Extend it to at least five questions.
- In the section “Short-Answer Quiz Questions,” we added short-answer questions to our multiple-choice quiz. Try adding two more short-answer questions to your quiz. Remember that you will need additional `Question` procedures.
- In the section “Try Again and Again: Answer Again After It’s Right,” we created a simple multiple-choice quiz that only counts the student’s first try on each question. Try to add two more multiple-choice questions to the quiz. Remember that you will need additional variables `q3answered` and `q4answered` as well as `RightAnswer3`, `WrongAnswer3`, `RightAnswer4`, and `WrongAnswer4` procedures.
- In the section “Try Again and Again: Answer Again After It’s Right,” try to add two additional short-answer questions.
- In the section “How Did You Do: Reporting Results to the Teacher,” we created a slide with the results that was ready to be printed. Follow the directions in that section to add two additional questions to your quiz. One should be a multiple-choice question, and the other should be a short-answer question.
- In the section “Learn First, Ask Questions Later: The Tutorial and Quiz,” you created a simple tutorial and quiz with the shapes hidden and shown—to indicate which sections of the tutorial were completed—and a quiz button that is hidden until all sections of the tutorial are finished. Add a fourth section to your tutorial and use one of the more complex quiz structures (at least something that keeps score) for your quiz.

9

More Tricks for Your Scripting Bag

Introduction

In Chapter 8 you used all the tricks you had learned in previous chapters to create quizzes and tests. This chapter will add to your scripting bag of tricks to help you do more with the examples from previous chapters, create some of your own examples, and understand some of the things you have already used. You will learn more about `If` statements and loops (such as the `While` loops you have already seen) and about timed functions, automatically saving or not saving your presentation, and random numbers. The chapter concludes with a complete example that uses random numbers to randomly show different questions from a large pool. Many of the tricks in this chapter make your scripting life a lot easier, but they are harder to understand on a conceptual level. As usual, you can take these scripts and use them without understanding anything about how they work, but if you want to modify them to fit your needs perfectly, you'll probably have to do less typing but more thinking.

Vocabulary

- Array
- Conditional
- Dirty
- `Do` loop
- `For` loop
- `If`
- Infinite loop
- Loop
- Nested `If`
- Object
- Parameter
- `Set`
- Stopping condition
- `While` loop

Conditionals: The `If` Statement

It is common to want to do one thing under certain circumstances and something else under other circumstances. If it is raining, we will play inside. Otherwise, we will play outside. We like to do this in VBA as well. We might say:

```
If raining = True Then
   PlayInside
Else
   PlayOutside
End If
```

The `If` statement asks a question. If the answer is yes, we do the first thing. If the answer is no, we do what comes after the `Else`. The previous code is exactly the same as the English sentences:

```
If it is raining Then
   We will play inside
Otherwise
   We will play outside
```

The question can be anything that returns a `True` or `False` answer. We might compare the value of a variable to something. For example:

```
If numCorrect > 6 Then
   MsgBox "You got a lot of questions right."
Else
   MsgBox "You can do better than that."
End If
```

In this case, if the variable `numCorrect` (presumably that was used by some other procedures to count the number of questions that were answered correctly) is greater than 6, a `MsgBox` will pop up saying, “You got a lot of questions right.” If the variable `numCorrect` is not greater than 6 (it is 6 or less), then the `MsgBox` will say, “You can do better than that.”

This can be extended to check more than one thing using `ElseIf`. You might say: if it is raining, we will play inside; if it is snowing, we will build snowmen; otherwise, we will play baseball.

```
If raining = True Then
   PlayInside
ElseIf snowing = True Then
   BuildSnowmen
Else
   PlayBaseball
End If
```

In this case, we ask one question. If the answer is yes, we do the first thing. If the answer is no, we ask a second question. If the answer to the second question is yes, we do the second thing. If the answer to the first question is no, and the answer to the second question is no, we do the third thing. Note, we can ask as many questions as we want by putting more and more `ElseIf` statements. Imagine a grading program that converts numbers to letter grades:

```
Sub WhatsMyGrade()
   If gradeNum >= 90 Then
      MsgBox "You got an A"
   ElseIf gradeNum >= 80 Then
      MsgBox "You got a B"
   ElseIf gradeNum >= 70 Then
      MsgBox "You got a C"
   ElseIf gradeNum >= 60 Then
      MsgBox "You got a D"
   Else
      MsgBox "You got an F"
   End If
End Sub
```

This assumes that a variable named `gradeNum` has been given a value somewhere else. It then asks the question, is this grade greater than or equal to 90? If the answer is yes, it pops up a box with the message "You got an A," and it stops. However, if the answer is no, it asks the next question: is this grade greater than or equal to 80? If the answer to this question is yes, it pops up a box with the message "You got a B," and it stops. It keeps asking questions as long as the answers are no. If all the answers are no, it reaches the `Else` statement and pops up a box with the message, "You got an F."

Note that once you get a "yes" answer to an `If` or `ElseIf` question, the computer does what you asked it to do and stops asking. All the other `ElseIf` questions could be `True`, but it doesn't matter because it stops after it finds the first one. In the grade example, a person who got a grade of 95 has a grade greater than 90, greater, than 80, greater than 70, and greater than 60. But once the computer executes:

```
If gradeNum >= 90 Then
   MsgBox "You got an A‶
```

it stops and never bothers to ask `If gradeNum` >= `80` or `If gradeNum` >= `70` or `If gradeNum` >= `60`. Even though all of those questions would be "yes," it never says "You got a B" or "You got a C" or "You got a D."

You can do more than one thing in response to a yes answer. You might, for example, pop up a MsgBox and then move to the next slide under one condition, but pop up a different MsgBox and then move to the previous slide under a different condition:

```
If gradeNum >= 90 Then
   MsgBox "You got an A."
   ActivePresentation.SlideShowWindow.View.Next
Else
   MsgBox "You need to work harder."
   ActivePresentation.SlideShowWindow.View.Previous
End If
```

Because you can do several things in response to a yes answer, you can do several complicated things. The prior example uses two simple statements, but you can have as many statements as you want. Some of these statements might be complicated structures like loops (see the next section) and other If statements. When you put an If block inside an If block, it is called a nested If. If the answer to your question is yes, you might want to ask other questions:

```
If gradeNum >= 90 Then
   MsgBox ("You got an A.")
   If previousGradeNum >= 90 Then
      MsgBox ("Good job. Two A grades in a row!")
   End If
   ActivePresentation.SlideShowWindow.View.Next
Else
   MsgBox ("You need to work harder.")
   ActivePresentation.SlideShowWindow.View.Previous
End If
```

Pay careful attention to the way this example is indented. Although you don't have to type it indented in this way, it is much easier to understand with the indenting. You can see that the question is asked: Is gradeNum greater than 90? Everything between the first If and the Else is indented to show that it is what to do if the answer is yes. Part of what to do is to ask another question. That question asks if previousGradeNum also is greater than 90. This question will only get asked if gradeNum is greater than 90. The indenting helps to see the nesting. It is particularly helpful if the nested If block is more complicated, with its own Else, for example. The Else should always be lined up with the If with which it goes.

The If statement is very powerful. It is one of the things that allows for interaction. Without conditional statements, every user would do exactly the same thing as the previous user.

Looping

If statements allow you to make choices based on whether or not a condition is true. Looping allows you to do something over and over again. How many times is based on a condition, that is, a question like what you ask in an If statement. This is known as the stopping condition. In some types of loops (such as a While loop), this question is phrased as a *keep going* question, and in other types of loops (such as a For Next loop), the condition is based on how many times you say you want to loop. However the question is phrased, the loop needs to know when to stop.

While Loops

There are several types of loops, and you might want to explore different ones, but once you know one, you can do just about anything you might want to do. Let's look at the While loop. The While loop asks a question and keeps looping *while* the answer to the question is yes. When my daughter was four, she might have asked, "Is it still raining?" She might ask this over and over again until it has stopped raining. As long as it is raining, she will add another block to her tower and ask again:

```
While StillRaining
   AddBlockToTower
Wend
PlayOutside()
```

In this case, the question is: Is it still raining? If the answer is yes, add another block to the tower. The Wend statement stands for *While END* and simply limits the loop. Whatever is between the While and Wend statements will happen over and over again until the answer to the question is no. Many things can happen between a While and Wend; it is not limited to one statement. This loop will keep executing as long as it is still raining. Once it stops, the answer to the question will be no, and whatever is after the Wend will be executed. In this case, my daughter will finally go play outside.

We could use this to ask a question until the right answer is entered. For example:

```
Sub HowManyPlanets()
   Dim answer As String

   answer = ""
   While answer <> "eight" And answer <> "8" And answer <> "Eight"
      answer = InputBox _
         ("How many planets are there in our solar system?")
   Wend
End Sub
```

In this example, the procedure `HowManyPlanets` contains a `While` loop with a slightly complicated question. The question basically asks: Is the answer wrong? That is, is whatever the user typed not “eight,” “8,” or “Eight”? If it is not any of those, it will ask for the answer again and again and again until one of those answers is entered in the `InputBox`.

In Chapter 8, we used a variable `triesCount` to stop asking a question after three tries. In that example, we didn’t use a loop to keep asking—the student just kept pressing answer buttons over and over again. If we are going to use a loop, we need a way to stop the loop so the students don’t get stuck in the loop if they really don’t know the answer. In this example, the user will be asked three times, so our `While` question checks to be sure that the answer is wrong and that we have asked fewer than three times.

```
Sub HowManyPlanets()
   Dim answer As String
   Dim triesCount As Integer

   answer = ""
   triesCount = 0
   While answer <> "eight" And answer <> "8" And answer <> "Eight" _
      And triesCount < 3
      answer = InputBox _
         ("How many planets are there in our solar system?")
      triesCount = triesCount + 1
   Wend
End Sub
```

The variable `triesCount` is a number (an `Integer`). We started it out as 0 (`triesCount` = `0`) because at the beginning, we haven’t asked at all. Then we check to see whether the answer is not one of the right answers (eight, 8, or Eight), and we also check whether the count is still less than 3. If the answer is still wrong, and the count is still less than 3, we ask for the answer again and add 1 to `triesCount` (`triesCount` = `triesCount` + `1`). Once we have asked three times, `triesCount` will be 3. Then, the question in our `While` statement will be no because `triesCount` < `3` will be `False`. In that case, we will stop looping.

As the stopping question gets more and more complicated, we might want to change things a bit. We can keep the `While` statement simple and add a variable to know whether or not we are done; let’s call it `done`. The `While` statement will simply ask if we are not done (`While Not done`) and other things (possibly an `If` statement can be used to set the variable `done` to `True` or keep it `False`. Here’s a really simple one:

```
Sub HowManyPlanets()
   Dim answer As String
   Dim done as Boolean
   done = False
   While Not done
      answer = InputBox _
         ("How many planets are there in our solar system?")
      If answer = "8" Then
         done = True
      End If
   Wend
End Sub
```

In this case the only way `done` will be set to `True` and the looping will be stopped is if the student types "8" (and not "eight" or "Eight"). Note that this is similar to what we did in Chapter 6 with the `YourName` procedure. Setting up an `If` block allows you to check as many conditions as you like and set `done` based on those conditions. Then, the only question for `While` is: Are we done or not? If we are not done, keep looping.

Now, let's ask a more complicated question. We could put all the work into a simple `If` statement with:

```
If answer = "eight" Or answer = "8" Or answer = "Eight" _
   Or triesCount < 3 Then
```

That keeps the code short but might be a little less flexible—and a little harder to understand—than a bigger `If` block:

```
Sub HowManyPlanets()
   Dim answer As String
   Dim triesCount As Integer
   Dim done As Boolean

   answer = ""
   triesCount = 0
   done = False
   While Not done
      answer = InputBox _
         ("How many planets are there in our solar system?")
      triesCount = triesCount + 1
      If answer = "eight" Then
         done = True
      ElseIf answer = "8" Then
         done = True
      ElseIf answer = "Eight" Then
         done = True
      ElseIf triesCount >= 3 Then
         done = True
      Else
```

```
         done = False
      End If
   Wend
End Sub
```

Now, it is easy to do several things based on which answer is given. For example, `done` = `True` in some parts, we might put `MsgBox "Good job"` while in another part, or we might put `MsgBox "Sorry, that is incorrect, and you have tried too many times."`

`Do` Loops

`Do` loops are similar to `While` loops. They allow you to specify either a `While` condition (keep going *while* something is `True`) or an `Until` condition (keep going *until* something is `True`). They also let you specify the condition (ask the stopping question) at the beginning or the end. If the condition is at the beginning, the loop might never run (not even once). If the condition is at the end, the loop will always run at least once. Here are some simple examples:

```
Do
   answer = InputBox("How many planets are in the solar system?")
Loop Until answer = "8"

Do
   answer = InputBox("How many planets are in the solar system?")
Loop While answer <> "8"

Do While triesCount < 3
   answer = InputBox("What do you like to eat?")
   triesCount = triesCount + 1
Loop

Do Until triesCount >= 3
   answer = InputBox("What do you like to eat?")
   triesCount = triesCount + 1
Loop
```

In the first example, the loop will run at least once and ask the question: How many planets are in the solar system? After running the loop once, it will check to see if `answer` is 8. If it is, it will stop. If it isn't, it will loop *until* the answer is 8.

In the second example, the loop will run at least once and ask the question: How many planets are in the solar system? After running the loop once, it will check to see whether `answer` is not 8. It will keep looping *while* the answer is not 8. Note, this works exactly the same as the first example, but sometimes it is easier to ask a positive question than a negative question, particularly if the question has many parts with `And` and `Or`.

In the third and fourth examples, the condition will be checked before the loop runs. In the third example, the loop will only run if `triesCount` is less than 3, and it will keep looping *while* `triesCount` is less than 3. In the fourth example, the loop will stop running if `triesCount` is greater than or equal to 3, and it will keep looping *until* `triesCount` is greater than or equal to 3. Like the first two examples, these examples have exactly the same results, but sometimes it is easier to ask a positive question, and sometimes it is easier to ask a negative question.

`For Next` Loops

Sometimes you have a specific number of times you want to loop. `For Next` loops allow you to do this and keep a count of the loop. This could be done with a `While` or `Do` loop by adding one to a `count` variable inside the loop, but it can be easier with a `For Next` loop.

A simple example of a `For Next` loop follows:

```
For i = 1 To 10
   MsgBox "Counting … " & i
Next i
```

This uses the variable `i` and counts from 1 to 10. That is, `i` starts out at 1, and the loop keeps looping (everything between the `For` line and the `Next` line is run) over and over again, adding 1 to `i`, up to and including the time that `i` becomes 10. `Next i` says to go back to the beginning of the loop and increase `i`. As with all the other loops, you can put as many lines as you like between the `For` line and the `Next` line, and all those lines will be executed over and over again.

One small twist to this is that you don't have to count by ones. To do this, you add `Step` to the end of the `For` line. For example:

```
For i = 1 To 10 Step 2
   MsgBox "Counting … " & i
Next i
```

will count from 1 to 10 by twos. You can even count backward by making the `Step` negative:

```
For i = 10 To 1 Step -1
   MsgBox "Counting … " & i
Next i
```

`For Each` Loops

In PowerPoint, one of the most useful kinds of loops is the `For Each` loop. This allows you to go through each thing in a collection. The two collections you might use this with most often are the `Slides` collection and the `Shapes` collection. For example, to do something to each shape on a slide, you could have something like this:

```
   For Each oShp in ActivePresenation.SlideShowWindow.View.Shapes
      MsgBox "The shape's name is " & oShp.Name
   Next oShp
```

This goes through the shapes, one at a time, on the current slide. Each time it goes through the loop, it sets the variable `oShp` to be whatever shape it is up to. Then, you can do something with that shape. In this example, we simply put up a `MsgBox` with the shape's name, but we could move the shape, change its color, ask a question about the shape with an `If` statement (e.g., `If oShp.Left > 50`), or whatever we want.

With a nested loop, we can search through every shape on every slide with a loop to go through each shape inside a loop to go through each slide:

```
For Each oSld in ActivePresentation.Slides
   For Each oShp in oSld.Shapes
      MsgBox "The shape's name is " & oShp.Name
   Next oShp
Next oSld
```

Pay careful attention to the indenting. The indenting makes it clear that there is an outer loop (`For Each oSld`… up to `Next oSld`) that loops through each slide in the presentation. Everything in between happens for each slide. Then, indented from that, is an inner loop (`For Each oShp`… up to `Next oShp`). This inner loop first runs through all the shapes on the first slide, then runs through all the shapes on the second slide, etc.

`For Next`, `For Each`, `Do`, and `While` loops can get more complicated, but these basic loops should suit most of your purposes.

Infinite Loops

Before we leave looping, a word of warning about infinite loops: In all of our loops, we have set stopping conditions; that is, we have told the loop when to stop looping. What if the stopping condition is never met? Then you have an infinite loop, a loop that never stops. Here is a simple example (**don't type this**):

```
While 8 > 7
   MsgBox "Eight is still greater than seven."
Wend
```

Because `8 > 7` is always `True` (i.e., 8 is always greater than 7), this loop will never stop. Usually, you won't have something so obvious. You will either type something wrong (perhaps > when you meant <), or you will have a complicated expression with variables, and you won't realize that the condition for stopping never can be met.

If you get stuck in an infinite loop, it will appear that PowerPoint has frozen. In all likelihood, you will have to force PowerPoint to quit. On a Windows computer, you can use Ctrl-Alt-Delete (i.e., hold down the Ctrl and Alt keys while hitting the Delete key). Depending on the version of Windows you are running, you will either restart your computer or be given the option to stop an unresponsive application (PowerPoint, in this case). If you are on a Macintosh, you can use Command-Option-Esc (i.e., hold down the Command and Option keys while hitting the Esc key; note that the Command key is the one with the picture of the apple on it on older Macintosh keyboards). If you do this, you will lose any changes you made to your presentation since you saved it last. That is why it is very important to save changes often, particularly when you are working with loops. In fact, when testing out a loop, you should probably save your changes before you put PowerPoint in Slide Show View.

Parameters

Sometimes a procedure has all the information it needs when you write it. Sometimes it gets information from variables where we have stored information (as long as the variables are declared at the beginning of the module). At other times we want to give a procedure extra information as we go. We can do this with something called a parameter. A parameter is extra information sent to a procedure when it is called. We have used parameters when calling procedures (something as simple as a `MsgBox` takes a parameter: the text to display), but we have not used parameters in procedures we have written. Parameters are a very useful tool for programmers, but they can be a bit tricky. Following is a brief explanation of parameters, so when you see them in examples (such as the timed functions in the next section), you'll understand them.

Imagine that you wanted to put up a `MsgBox` with different messages for different occasions. Perhaps the message is the same except for one thing. For example, you might want to say, "You are doing well, Ella" at some point and "You are doing poorly, Ella" at another time. We have done this with two separate procedures in the past, but we could write one procedure with a parameter:

```
Sub Doing(doingHow As String)
   MsgBox "You are doing " & doingHow & ", " & username
End Sub
```

For something this simple, the parameter may not be worth the effort, but it can be very useful if the procedure that takes the parameter is more complicated. In this case `doingHow` is the parameter. It is a `String` because it is declared in the `Sub` statement to be a `String`, so another procedure would call `Doing` with a `String` after the procedure name. For example `Doing "well"` would pop up a message box that says, “You are doing well, Ella” (assuming the `userName` was “Ella”). This might be called from a procedure that included the following `If` block:

```
If numCorrect > 10 Then
   Doing "superbly"
ElseIf numCorrect > 8 Then
   Doing "well"
ElseIf numCorrect > 5 Then
   Doing "OK"
ElseIf numCorrect > 3 Then
   Doing "poorly"
Else
   Doing "very poorly"
End If
```

Parameters can be of any type. We used a `String` in this example, but you can pass various kinds of numbers or `Booleans` or even objects such as shapes. You can pass more than one parameter as well if you need different kinds of information passed to a procedure, but for most of your purposes, if you need a parameter at all, one will suffice. Parameters can be tricky and complicated, so we will not use them a lot, but now you have a basic understanding of how they work in case you see them in some examples.

Timed Functions

Most actions in PowerPoint happen because the user did something, such as pressing a button to go to another slide. Sometimes, however, you want things to happen whether or not the user has done anything. For example, you might want a sound to start playing a few seconds after the slide is shown. You might want the presentation to go from slide to slide on its own. You might want information to pop up on the screen, then go away, and then have other information pop up on the screen.

As soon as the user clicks on a button tied to a script with timing features (such as the button to go to another slide), you can start anything happening after any length of time. Of course, the standard animation choices (see Chapter 3) allow objects to appear with timing, but you might want to do more. If you want something to happen after a short delay, you can use the following procedure:

```
Sub Wait()
   Dim waitTime As Long
   Dim start As Long

   waitTime = 5
   start = Timer
   While Timer < start + waitTime
      DoEvents
   Wend
End Sub
```

This procedure waits five seconds. Timer is a function that returns the number of seconds since midnight (e.g., at 12:01 a.m., Timer will return 60). waitTime is a variable used to tell how many seconds to wait (change the number 5 to any number to have this procedure wait that number of seconds). At the beginning of the procedure, the variable start is set to the current time in seconds (as returned by Timer). Next, we loop until the current time is less than the time we started plus the waitTime (which is five seconds in our example). Inside the loop (between the While statement and the Wend statement), we run DoEvents. This lets VBA check to see if anything else is happening, particularly things that the user might do, such as hit the Escape key or click on another button. If you don't want the user to do anything while you are waiting, leave out DoEvents.

Be careful! If you make a mistake (perhaps you set the waitTime to five million seconds instead of five seconds or you mistyped Timer in the Do While statement), you could end up in an infinite loop, essentially freezing PowerPoint. If you feel you must stop the user from doing anything while VBA waits, leave DoEvents in your procedure until you are sure everything works. Once you are certain everything works, delete the DoEvents line. This will allow you to stop your presentation by hitting the Escape key while you are still testing your procedure.

Before we continue, get a new PowerPoint presentation and type the Wait procedure. Then add the following procedure:

```
Sub HelloWaitGoodbye()
   MsgBox "Hello"
   Wait
   MsgBox "Goodbye"
End Sub
```

When you run HelloWaitGoodbye, you should see a MsgBox that says "Hello." After you click OK to dismiss the MsgBox, you should see a MsgBox that says "Goodbye" but only after a delay of five seconds.

Now suppose that you want to wait but not always for five seconds. You could write several different procedures (Wait5, Wait10, Wait60, etc.) to wait different amounts of time, but we can use a simple parameter to write one procedure that can wait different amounts of time.

```
Sub Wait(waitTime As Long)
   Dim start As Long

   start = Timer
   While Timer < start + waitTime
      DoEvents
   Wend
End Sub
```

In this procedure, instead of setting the `waitTime` to five, we call `Wait` with however long we want to wait (e.g., `Wait 60` would wait 60 seconds).

Timed functions are useful if you want to give your users a chance to do something before moving on. For example, you might display a text box, wait a short time, then display a second text box. This allows the user to focus on the first text box before getting too much information. Be careful with timed functions because different people read at different speeds. If you set your wait times too long, some people will get restless waiting for the next thing to happen. If you set them too short, some people will not have time to finish the first thing.

Remember in Chapter 7 how we gave feedback by having a shape appear? You were just a beginner back then so you didn't even know how to go to the next slide with `ActivePresentation.SlideShowWindow.View.Next`. Because of that, the example had buttons on each slide to move to the next question. We could easily eliminate the next slide buttons and stick that line into the `RightAnswer` procedures for each question, such as:

```
Sub RightAnswerTwo()
   ActivePresentation.Slides("President Question") _
      .Shapes("GoodJobStar").Visible = True
   ActivePresentation.SlideShowWindow.View.Next
End Sub
```

Go ahead; try it out. What happened? Did you see the shape? Depending on your system, it might have flashed on the screen for a fraction of a second, like some bad subliminal message. That's because we told the computer to show the shape and, right away, we told it to jump to the next slide. Instead, we could use our `Wait` procedure to have it stay up for at least a second or two:

```
Sub Wait(waitTime As Long)
   Dim start As Long

   start = Timer
   While Timer < start + waitTime
      DoEvents
   Wend
End Sub
```

```
Sub RightAnswerTwo()
   ActivePresentation.Slides("President Question") _
      .Shapes("GoodJobStar").Visible = True
   Wait 2 'ADDED to wait two seconds before going to the next slide
   ActivePresentation.SlideShowWindow.View.Next
End Sub
```

Just beware that your students can click on the buttons while they are waiting so you might want to cover them up (making your star big enough to do that) or hide the buttons (using the `.Visible` property). Note that we don't need to wait when using a `MsgBox` because nothing happens until the `MsgBox` is dismissed by the user (e.g., clicking OK).

Some timing can be done automatically without VBA. You can use animations to have things appear and disappear as much as you like. However, as with many things that you can do without VBA, you might find that you can do more with VBA. For example, you might ask the user how fast to go:

```
speed = InputBox ("How fast do you read [fast, medium, slow]?")
```

Now when it is time to wait, you might do something like the following:

```
If speed = "fast" Then
   Wait 5
ElseIf speed = "medium" Then
   Wait 10
Else
   Wait 15
End If
```

You should note that wait times are approximate. This does not work well if you need precise timing, but it should do roughly what you want.

> ⚠ Warning! I have seen problems with PowerPoint 2011 on the Mac running timing procedures like those described earlier. Although computers generally run their instructions in order, the previous timing procedures seem to throw off that order. As of publication of this book, I have not been able to verify if this affects all installations of PowerPoint 2011, but if you use PowerPoint 2011 and have trouble with these procedures, it might be that a bug is causing things to not work as you anticipate. This mainly occurs when hiding, showing, or moving objects. I have not seen this problem with any other version of PowerPoint.

Saving and Quitting

When you use VBA to change your presentation in any way (including adding shapes, hiding shapes, changing text, etc.), PowerPoint recognizes that your project has been changed. Whenever a project has been changed, PowerPoint wants to save it. If you don't save it, and you exit PowerPoint, PowerPoint will ask you if you want to save. This is a good thing if you are designing a project and forgot to save before exiting. This might not be such a good thing if one of your students is running your project.

As the designer of an interactive multimedia project, you should know when you want to save and when you don't. In "How Did You Do: Reporting Results to the Teacher" in Chapter 8, we added a slide to report the results, but we didn't want to save the slide. In this case, PowerPoint knows that the presentation has been changed, so we needed to make it think that it was not changed. Of course, changes that PowerPoint thinks need to be saved do not have to be as large as adding a slide. Changes as small as hiding or showing an object, such as a shape that indicates the student has visited part of the tutorial in "Learn First, Ask Questions Later" in Chapter 8, will make PowerPoint think your presentation needs to be saved.

In other cases, we might want the changes to be saved. Chapter 12 includes an example in which important slides are being added to the presentation. As users go through the project, they might be asked for information, which is stored on a newly created slide. Later, the designer will go through the presentation and look at those slides … only if they were saved.

Fortunately, it is very easy to control whether or not your presentation is saved. Five simple procedures will help you:

```
Sub MakeNotDirty()
   ActivePresentation.Saved = True
End Sub

Sub Save()
   ActivePresentation.Save
End Sub

Sub Quit()
   Application.Quit
End Sub

Sub ExitSlideShow()
   ActivePresentation.SlideShowWindow.View.Exit
End Sub

Sub QuitAndSave()
   Save
   Quit
End Sub
```

In computer terms, a presentation that is changed but not saved is called “dirty.” The status of the current presentation (whether it is dirty or not, i.e., whether it has been changed or not since the last time it was saved) is stored in the property `ActivePresentation.Saved`. Even if the presentation has been changed, we can fool PowerPoint into thinking that it hasn’t been changed by setting the `ActivePresentation.Saved` to `True` as in the earlier `MakeNotDirty` procedure. If you call this procedure (or simply put the line `ActivePresentation.Saved` = `True` into some other procedure), PowerPoint will not ask you if you want to save the presentation when you quit. Be sure you do this every time you make a change because the next change you make will make the presentation dirty again, setting `ActivePresentation.Saved` back to `False`.

You probably want to do this right away when you make a change. In fact, you should do it in the procedure that makes the change. For example:

```
Sub StartAgain()
   ActivePresentation.SlideShowWindow.View.GotoSlide 1
   ActivePresentation.Slides(printableSlideNum).Delete
   ActivePresentation.Saved = True
End Sub
```

This procedure is from the example in “How Did You Do: Reporting Results to the Teacher” in Chapter 8. This procedure jumps to the first slide and deletes the last slide (which had been created temporarily in an earlier procedure). Once it deletes the last slide, the presentation is dirty, but we don’t want anyone to be asked to save it. By setting `ActivePresentation.Saved` to `True`, the students won’t be asked.

For the cases where you want to save a presentation, you can use the earlier `Save` procedure. As long as the place where the presentation is running is a location that can be saved (unlocked disk, network folder where the user has write privileges, etc.), `Save` will save the presentation without the user even knowing (unless it is saving something to a slow device like a floppy disk, in which case it might take a few seconds to save). You would use this (or simply the line `ActivePresentation.Save`) immediately after doing something that you want saved. An example of this can be found in Chapter 12:

```
Sub WorkTogether()
   GetNameEmailIdea
   GoToWorkTogether
   AddWorkTogetherSlide
   Save
End Sub
```

In this example, information is collected (using the `GetNameEmailIdea` procedure), the presentation jumps to another slide (using the `GoToWorkTogether` procedure), and a new slide is added to the presentation (using the `AddWorkTogetherSlide` procedure, which is where the presentation becomes dirty). Finally, the presentation is saved (using the `Save` procedure). The saving happens automatically without the user's knowledge. Of course, the `Save` procedure from earlier must be included in your VBA.

Finally, you might want to quit the presentation (possibly when a user presses an Exit button). If you weren't worried about saving, you could simply hyperlink a button to End Show (using traditional PowerPoint and no VBA). If you are worried about saving or you want other things to happen when the Exit button is pressed as well), you will need something like the last two or three procedures. `Quit` will quit PowerPoint without saving and without asking the user whether or not to save. Be careful with this. If you are trying out your `Quit` procedure while you are creating your presentation and you haven't saved, your changes will be lost. This includes changes to your VBA code. Therefore, you should always save your presentation before trying it out.

`ExitSlideShow` is similar to `Quit`, but it just exits Slide Show View rather than quitting PowerPoint. Of course, if your file is a PowerPoint Show that opened directly in Slide Show View, exiting the slide show is the same as quitting PowerPoint.

`QuitAndSave` calls our `Save` procedure before quitting, so the presentation will be saved. Note that `Save` ignores whether or not the presentation is dirty; it saves regardless. Thus, you don't want to run `Save` if you have made changes that you don't want saved (even if you have called `MakeNotDirty`).

Being sure that changes are saved or not saved as you, the designer, know they should be is very important. Your students won't know whether they should save or not, and they shouldn't be bothered by being asked. The procedures in this section will help you manage the saving or not saving of your presentation.

Adding PowerPoint Objects

In earlier chapters, we hid and showed any objects that we wanted after using normal PowerPoint drawing features to create the objects. Any object that you can create with PowerPoint drawing tools you can create and manipulate with VBA. In fact, you could use VBA to create your entire presentation, including all the slides, all the buttons, all the shapes, and all the text. For almost all your purposes, you are better off creating the shapes with PowerPoint drawing tools and using VBA to hide and show them, but we have already seen an example that adds slides and adds shapes to it (see "How Did You Do: Reporting Results to the Teacher" in Chapter 8).

The problem with adding shapes is that they can collect in your presentation and can be hard for you to delete. For example, consider the star we hid and showed earlier in this chapter and in Chapter 7. Instead of hiding it and showing it, we could use VBA to create it. The problem is that once the shape is created, it is part of the presentation. Unless you are careful, you will have that shape (and possibly several copies of that shape) incorporated into your presentation. You can delete the shape when you are done, but this is an extra thing to track and not generally worth the effort.

If you are not dissuaded from adding shapes and would like to try it, you can try this example. If you heed my warnings, you'll skip this, go on to the next section, and only come back to this to understand the examples, such as ones in Chapter 8 and 12.

Let's add a simple square in the middle of the screen:

```
Sub AddRectangle()
   Dim myShape As Shape

   Set myShape = _
      ActivePresentation.SlideShowWindow.View.Slide.Shapes _
      .AddShape(Type:=msoShapeRectangle, Left:=100, Top:=100, _
      Width:=200, Height:=200)
   myShape.Fill.ForeColor.RGB = vbRed
   myShape.TextFrame.TextRange.Text = "Hello"
End Sub
```

This looks complicated, but it is not as complicated as it looks. This procedure does three things: It creates the rectangle, it turns it red, and it puts the word "Hello" inside. Let's take it line by line:

```
Dim myShape As Shape
```

We are going to create a shape, so we create a variable to hold that shape. That way, once the shape is created, we can refer to it later in the procedure. Next we create the shape:

```
Set myShape = _
   ActivePresentation.SlideShowWindow.View.Slide.Shapes. _
   AddShape(Type:=msoShapeRectangle, Left:=100, Top:=100, _
   Width:=200, Height:=200)
```

`ActivePresentation.SlideShowWindow.View.Slide` gives us the current slide. `Shapes` gives us the shapes on the slide, and the `AddShape` method is used to add a shape to the shapes on the slide. Now, everything between the parentheses is simply telling you about the shape:

- The `Type` is what shape you are creating: `msoShapeRectangle` for a rectangle.
- `Left` and `Top` are the location on the screen of the top left corner of the shape
- `Width` and `Height` are how wide and tall the shape is.

Some other shapes you might use instead of `msoShapeRectangle` are:

```
msoShape4pointStar
msoShape5pointStar
msoShape8pointStar
msoShapeBalloon
msoShapeBentArrow
msoShapeBentUpArrow
msoShapeCross
msoShapeCube
msoShapeCurvedDownArrow
msoShapeCurvedLeftArrow
msoShapeCurvedRightArrow
msoShapeCurvedUpArrow
msoShapeDiamond
msoShapeDonut
msoShapeDownArrow
msoShapeHeart
msoShapeHexagon
msoShapeIsoscelesTriangle
msoShapeLeftArrow
msoShapeLightningBolt
msoShapeMoon
msoShapeNoSymbol
msoShapeOctagon
msoShapeOval
msoShapeParallelogram
msoShapePentagon
msoShapeRectangle
msoShapeRightArrow
msoShapeRightTriangle
msoShapeRoundedRectangle
msoShapeSmileyFace
msoShapeSun
msoShapeTrapezoid
msoShapeUpArrow
```

Try replacing `msoShapeRectangle` with some of the other shapes from this list.

Finally, we set some properties of the shape. Since the shape is stored in the variable `myShape`, we can use `myShape` to manipulate some of the shape's properties:

```
myShape.Fill.ForeColor.RGB = vbRed
```

This line takes the shape we just created and stored in the variable `myShape` and adjusts its color. This looks complicated, but you just have to remember that if you want to change the color of a shape, you need to adjust the `.Fill.ForeColor.RGB`. After the equal sign is the color we want. There are many ways to specify the exact color, but you can use the following basic colors: `vbBlack`, `vbRed`, `vbGreen`, `vbYellow`, `vbBlue`, `vbMagenta`, `vbCyan`, and `vbWhite`.

Most shapes can also have words in them. If you want to set the text in the shape to "Hello," use the following line:

```
myShape.TextFrame.TextRange.Text = "Hello"
```

This is simply a long way of saying that the text in this shape should be set to "Hello."

What is `Set`? You might have noticed that sometimes we assign something to a variable with `Set` and = and sometimes we just use = . For normal variables, = is the assignment operator. Whatever is on the right of = is put into the variable listed on the left of = . We use set for special variables called *objects*. Shapes and slides are the types of objects we use most commonly, but there are many more. Anything that has properties and methods associated with it is an object, and when assigning something to an object variable, you need `Set`. Technically, this is because you are not simply taking a value and putting it in an object variable; the object variable will contain a pointer to the actual object. If we assign `numCorrect` the value 7, `numCorrect` simply contains the value 7. However, if we set `myShape` to a particular shape on a slide, we actually have a pointer to that shape, and changes to `myShape` actually change the particular shape.

Adding objects can be useful, especially if you want the user to make significant changes to the presentation. In the example in Chapter 12, the user adds slides to the presentation. These slides become part of the presentation, and there are an undetermined number of them (every user that goes through the presentation can add slides to it). In most cases, however, you will have a few shapes that you have determined in advance. Rather than creating those shapes in VBA, you would do better to create them in PowerPoint and hide and show them with VBA. This will prevent your presentation from getting cluttered with extra shapes when a user hits a button too many times and adds several extra shapes.

Arrays

Computer programs can use many different kinds of data structures. Understanding data structures is an important part of computer programming. However, throughout this book I have avoided turning you into a programmer and only shown you what you need to know to be a scripter. The topic of data structures is something you can avoid, but if you understand some basic data structures, they can make your life easier. In fact, some of the examples that you have seen could have been simpler with some more advanced data structures. I have made some earlier examples longer so that they would be easier to understand.

Data structures are a way to store information. In Chapter 6 we used the box analogy to show how variables can be used to store information, but sometimes information can be stored more easily in something other than a single box. A collection of numbered boxes might be more suitable. This collection of numbered boxes is an array. You might think of an array as an egg carton, with sections for each of several eggs.

In several earlier examples, such as the example in “Try Again and Again: Answer Again After It’s Right” from Chapter 8, we created our own numbered variables. In that example, we used `q1Answered` and `q2Answered` to store the information about whether question 1 was answered and whether question 2 was answered. If we had more questions, we would add more variables. This is easy to understand but difficult to type, particularly if we have a lot of questions. This could be simplified with an array.

The first step is to declare the array. Suppose we have five questions. Without an array, we would do the following to declare our five variables:

```
Dim q1Answered As Boolean
Dim q2Answered As Boolean
Dim q3Answered As Boolean
Dim q4Answered As Boolean
Dim q5Answered As Boolean
```

If we were to use an array, we would have one line:

```
Dim qAnswered(5) As Boolean
```

This will give us an array that contains six boxes, numbered 0 through 5: `qAnswered(0)`, `qAnswered(1)`, `qAnswered(2)`, `qAnswered(3)`, `qAnswered(4)`, and `qAnswered(5)`. Note that we really only need five boxes in our example, and we got six. There are many ways to avoid getting the extra box, but unless you are an aspiring programmer, the easiest thing to do is simply ignore box number 0.

Now, we can shorten our `Initialize` procedure. It won't be shorter with two questions (or significantly shorter with five), but when you create something with 10 or 20 or 100 questions, it will be much shorter:

```
Sub Initialize()
   Dim i As Long

   numCorrect = 0
   numIncorrect = 0
   For i = 1 to 5
      qAnswered(i) = False
   Next i
End Sub
```

This procedure uses a `For` loop, just like what we saw in "Looping" (pp. 159–165). It loops through each of the members of the `qAnswered` array and sets each to `False`. In the original version, every time you added a new question, you would need to add a new `Dim` statement and a new line in `Initialize`. Now, the only thing you have to change is the number `5` in your `Dim` statement and in the `For` line of your `Initialize` procedure.

Having a separate variable for each question was only a little inconvenient. The biggest inconvenience was having a separate `RightAnswer` and `WrongAnswer` procedure for each question. We needed this

1. to assign True or False to the correct qAnswered variable;
2. to know which question was being answered so we could know which was the appropriate qAnswered variable for number 1; and,
3. in later examples, to assign the actual answer to the correct answer variable.

Our array takes care of number 1. Number 2 can be handled easily if our questions are all in order. In our examples with the questions beginning on slide 2, each question is one less than the slide number (i.e., question 1 is on slide 2, question 2 is on slide 3, etc.), so to get the question number, we simply subtract one from the slide number (ActivePresentation.SlideShowWindow.View.Slide.SlideIndex – 1). We'll take care of number 3 in the next section.

Using the Dim statements and Initialize procedure from earlier and the GetStarted and YourName procedures from any of the previous examples, we can use the following RightAnswer procedure and WrongAnswer procedure to replace all the specialized RightAnswer and WrongAnswer procedures. The only thing you ever have to change is the number 5 in the Dim statement and the Initialize procedure. Just make this number equal to the number of questions you have.

```
Sub RightAnswer()
   Dim thisQuestionNum As Long

   thisQuestionNum = _
      ActivePresentation.SlideShowWindow.View.Slide.SlideIndex – 1
   If qAnswered(thisQuestionNum) = False Then
      numCorrect = numCorrect + 1
   End If
   qAnswered(thisQuestionNum) = True
   MsgBox "You are doing well, " & userName
   'Delete the following if you don't want to go to the next line
   ActivePresentation.SlideShowWindow.View.Next
End Sub

Sub WrongAnswer()
   Dim thisQuestionNum As Long

   thisQuestionNum = _
      ActivePresentation.SlideShowWindow.View.Slide.SlideIndex – 1
   If qAnswered(thisQuestionNum) = False Then
      numIncorrect = numIncorrect + 1
   End If
   qAnswered(thisQuestionNum) = True
   MsgBox "Try to do better next time, " & userName
End Sub
```

I Don’t Know How Many Questions: `ReDim` to the Rescue

It is very nice to cut down on the amount of VBA code that needs to be changed, but wouldn’t it be nice to have these procedures work without changing any VBA code? The problem is that we need to know how many questions we have so we can declare and initialize our `qAnswered` array. VBA is very nice about this; if you don’t know how many items you need in an array, it lets you tell it whenever you know. We can declare the array with the following `Dim` statement (note that nothing is between the parentheses):

```
Dim qAnswered() As Boolean
```

This says that we need an array `qAnswered` to hold `Boolean` values, but we don’t know how many values we’ll need to hold. When we do know how many values, we can use the `ReDim` statement to tell VBA.

The question is, how and when do we know how many values we need? The answer is that we know right away, and we can tell by how many slides we have. In our example, we have five question slides, one title slide, and one results slide, for a total of seven slides. That is, all but two of our slides (the title slide and the results slide) are questions slides. Thus our total number of questions is the total number of slides minus two:

```
ActivePresentation.Slides.Count – 2
```

We can use this in our `Initialize` procedure by assigning this value to a variable (we’ll use `numQuestions`), using `ReDim` to tell VBA how many items we need in `qAnswered`, and using this value in our `For` loop to initialize each item.

```
Sub Initialize()
   Dim i As Long
   Dim numQuestions As Long

   numCorrect = 0
   numIncorrect = 0
   numQuestions = ActivePresentation.Slides.Count – 2
   ReDim qAnswered(numQuestions)
   For i = 1 To numQuestions
      qAnswered(i) = False
   Next i
End Sub
```

Two words of warning about ReDim:

1. Because you have already told VBA what kind of variable numQuestions is with the Dim statement, you do not tell it again (notice that ReDim leaves off the As Boolean in our example).
2. ReDim erases the contents of the array, so be sure that you use it before you put anything in the array. That’s why it is toward the beginning of Initialize.

Using the new Dim statement and the new Initialize procedure, you never have to change the VBA. This makes it easier for you because you can add and change questions with no VBA changes, and it turns this into a powerful tool for your students; they can make their own quizzes that use your VBA (see Chapter 12 for more about templates). Some of you will want to teach your students VBA, but most of you will not. If you can write the code, all they have to do is create the questions and tie the buttons to the RightAnswer and WrongAnswer procedures.

Short-answer questions will still need VBA to check the answer. You can either:

- stick to multiple-choice questions and never touch this code, or
- use short-answer questions by writing Question1, Question2, Question3, etc., procedures for each short-answer question but having each Question procedure call RightAnswer and WrongAnswer, not specialized RightAnswer1 and WrongAnswer1, RightAnswer2 and WrongAnswer2, RightAnswer3 and WrongAnswer3, etc., procedures.

With either choice, your VBA is greatly simplified. You could probably even teach your students to copy and paste new question procedures, simply changing the number of the question in the Sub line and the text for the question and right answer. For example:

```
Sub Question3()
   Dim answer As String

   answer = InputBox(prompt:="What is the capital of Maryland?", _
      Title:="Question 3")
   If answer = "Annapolis" Then
      RightAnswer
   Else
      WrongAnswer
   End If
End Sub
```

You should notice that this is exactly the same as the `Question3` procedure in “Short-Answer Questions” in Chapter 8 (p. 127). The hard work is done in the previous `RightAnswer` and `WrongAnswer` procedures.

Which Button Did I Press?

The prior example works very well when you don’t need to keep track of which answer was chosen. But what about the example from Chapter 8 in “How Did You Do: Reporting Results to the Teacher”? In that example, each answer needs to be stored. Short-answer questions don’t have much of an issue because you already have to use VBA to check the answer, so you can easily stick the answer in a variable at that time. But for multiple-choice questions, we don’t want to go back to a procedure for each button like we did in the example in Chapter 8. A procedure for each button is easy to understand, but the amount of code can be overwhelming if you have a lot of questions.

Fortunately, there is a VBA trick that can save us. Try assigning the following procedure to a button. In fact, create a slide with several buttons, add different text to each button, and attach this procedure to each button:

```
Sub WhichButton(answerButton As Shape)
   Dim theAnswer As String
   theAnswer = answerButton.TextFrame.TextRange.Text
   MsgBox "You chose " & theAnswer
End Sub
```

This uses a special trick with parameters (see “Parameters” in this chapter). When a button is pressed, it can pass the button itself as a parameter to the procedure that called it. Normally, we use VBA to pass parameters (by putting them in parentheses when we call a procedure), but in this case, clicking the button passes the parameter. We just have to set up our procedure to store the parameter. In this example, we used the variable `answerButton`. Once we have a pointer to the button itself (i.e., `answerButton`), we can get the text that is in the button with `answerButton.TextFrame.TextRange.Text`. If you have put the answer in the text of the button, you can use that to get the answer that was chosen.

Now we can store the answers for a printable slide without adding any extra code for each multiple-choice question and without adding very much extra code for each short-answer question. Our code for the simple three-question example is a bit longer, but as you add more questions, the overall code will be much shorter. In fact, just like the previous example, if you only use multiple-choice questions, you do not have to change the code at all when you add questions.

⚠

Warning! PowerPoint 2011 for the Macintosh has a bug related to the code in this section. Hopefully, it will be fixed in future updates or future versions, but, as of this writing, the code does not work. When using this section's trick, the code

```
Sub WhichButton(answerButton As Shape)
```

does set the variable `answerButton` to point to the button that was pressed. However, when trying to access the text in that button, it does not work. Thus, `answerButton.TextFrame.TextRange.Text` produces a mysterious error and causes your VBA to stop. However, there is a workaround for this. Instead of

```
answerButton.TextFrame.TextRange.Text
```

use the following bit of code:

```
answerButton.Parent.Shapes(answerButton.Name) _
  .TextFrame.TextRange.Text
```

If you must know, this takes the pointer to the shape (`answerButton`) and gets its parent (the slide that the shape is on) and its name (`answerButton.Name`) to get a new pointer to the shape that isn't affected by the bug. It's a bit like having to say "my mother's son named David" instead of "me." It's awkward, but it works.

The new code follows. The `GetStarted` and `YourName` procedures are the same ones we have used many times before. We can also use the new `RightAnswer` and `WrongAnswer` procedures from the previous example. However, these procedures will not be tied directly to buttons. Instead, for multiple-choice questions we will add two new procedures, `RightAnswerButton` and `WrongAnswerButton`, that will be tied to the buttons with right and wrong answers. Here are the new procedures, together with the `Dim` statements and a slightly modified `Initialize` procedure. Use `GetStarted` and `YourName` procedures from any earlier example, and use `RightAnswer` and `WrongAnswer` procedures from the previous example, along with the following:

```
Dim numCorrect As Integer
Dim numIncorrect As Integer
Dim userName As String
Dim qAnswered() As Boolean 'Array to store if the question was answered
Dim answer() As String 'Array to store answers
Dim numQuestions As Long
Dim printableSlideNum As Long

Sub Initialize()
   Dim i As Long

   numCorrect = 0
   numIncorrect = 0
   printableSlideNum = ActivePresentation.Slides.Count + 1
   numQuestions = ActivePresentation.Slides.Count – 2
   ReDim qAnswered(numQuestions)
   ReDim answer(numQuestions)
   For i = 1 To numQuestions
      qAnswered(i) = False
   Next i
End Sub

Sub RightAnswerButton(answerButton As Shape)
   Dim thisQuestionNum As Long

   thisQuestionNum = _
      ActivePresentation.SlideShowWindow.View.Slide.SlideIndex – 1
   If qAnswered(thisQuestionNum) = False Then
      answer(thisQuestionNum) = answerButton.TextFrame.TextRange.Text
   End If
   RightAnswer
End Sub

Sub WrongAnswerButton(answerButton As Shape)
   Dim thisQuestionNum As Long

   thisQuestionNum = _
      ActivePresentation.SlideShowWindow.View.Slide.SlideIndex – 1
   If qAnswered(thisQuestionNum) = False Then
      answer(thisQuestionNum) = answerButton.TextFrame.TextRange.Text
   End If
   WrongAnswer
End Sub
```

You have already seen (in the `RightAnswer` and `WrongAnswer` procedures) `thisQuestionNum` used to store the number of the current question. The only new code is the `Dim` statement to declare `answer` as an array and the `answerButton.TextFrame.TextRange.Text` to get the text from the button that was pressed (as described earlier). In addition, we have done a bit of restructuring. In the original example in Chapter 8, each button had its own procedure, and that procedure took care of storing the answer, keeping track of which question was answered, and keeping score. We have divided up that work. Now the `RightAnswerButton` and `WrongAnswerButton` procedures take care of storing the answer, and the `RightAnswer` and `WrongAnswer` procedures take care of keeping track of which question was answered and keeping score.

> Note the mistake you are most likely to make at this point is to assign the button to the wrong procedure. Be sure to double check that you have assigned wrong answers to the `WrongAnswerButton` procedure and right answers to the `RightAnswerButton` procedure.

This division of labor will be important when we add a short-answer question. For short-answer questions, we are going to need a `Question` procedure for each question. That procedure will ask the question, judge the answer, and store the answer. When it figures out if the answer was right or wrong, it will call the `RightAnswer` or `WrongAnswer` procedure. So we need the following procedures:

- Each short-answer question needs its own `Question` procedure (`Question1`, `Question2`, `Question3`).
- All the multiple-choice questions need one `RightAnswerButton` and one `WrongAnswerButton` procedure, which will be tied to every button with a right and wrong answer, respectively.
- All the questions need one `RightAnswer` and `WrongAnswer` procedure, which is called from `RightAnswerButton`, `WrongAnswerButton`, and each `Question` procedure.

Next, our `Question` procedures need a slight modification so they can store the answer in the `answer` array. Here is an example procedure for `Question3`:

```
Sub Question3()
   Dim theAnswer As String
   Dim thisQuestionNum As Long

   thisQuestionNum = _
      ActivePresentation.SlideShowWindow.View.Slide.SlideIndex – 1
   theAnswer = InputBox(prompt:="What is the capital of Maryland?", _
      Title:="Question " & thisQuestionNum)
   If qAnswered(thisQuestionNum) = False Then
      answer(thisQuestionNum) = theAnswer
   End If
   theAnswer = Trim(theAnswer)
   theAnswer = LCase(theAnswer)
   If theAnswer = "annapolis" Then
      RightAnswer
   Else
      WrongAnswer
   End If
End Sub
```

The changes to this procedure from the example in Chapter 8 are simply to account for the fact that `answer` and `qAnswered` are arrays now. Nothing else has changed.

The final change to our code comes in the `PrintablePage` procedure. You could simply change this procedure to use the array (using `answer(1), answer(2), answer(3)`, instead of `answer1`, `answer2`, `answer3`), but this would require you to change the procedure every time you add a new question. The purpose of complicating our code with arrays was to eliminate any unnecessary changing of code. Our new `PrintablePage` procedure follows:

```
Sub PrintablePage()
   Dim printableSlide As Slide
   Dim homeButton As Shape
   Dim printButton As Shape

   Set printableSlide = _
      ActivePresentation.Slides.Add(Index:=printableSlideNum, _
      Layout:=ppLayoutText)
   printableSlide.Shapes(1).TextFrame.TextRange.Text = _
      "Results for " & userName
   printableSlide.Shapes(2).TextFrame.TextRange.Text = _
      "Your Answers" & Chr$(13)
   For i = 1 To numQuestions
      printableSlide.Shapes(2).TextFrame.TextRange.Text = _
         printableSlide.Shapes(2).TextFrame.TextRange.Text & _
         "Question " & i & ": " & answer(i) & Chr$(13)
   Next i
   printableSlide.Shapes(2).TextFrame.TextRange.Text = _
      printableSlide.Shapes(2).TextFrame.TextRange.Text & _
      "You got " & numCorrect & " out of " & _
      numCorrect + numIncorrect & "." & Chr$(13) & _
      "Press the Print Results button to print your answers."
   printableSlide.Shapes(2).TextFrame.TextRange.Font.Size = 9
   Set homeButton = _
      ActivePresentation.Slides(printableSlideNum).Shapes _
      .AddShape(msoShapeActionButtonCustom, 0, 0, 150, 50)
   homeButton.TextFrame.TextRange.Text = "Start Again"
   homeButton.ActionSettings(ppMouseClick).Action = ppActionRunMacro
   homeButton.ActionSettings(ppMouseClick).Run = "StartAgain"
   Set printButton = _
      ActivePresentation.Slides(printableSlideNum).Shapes _
      .AddShape(msoShapeActionButtonCustom, 200, 0, 150, 50)
   printButton.TextFrame.TextRange.Text = "Print Results"
   printButton.ActionSettings(ppMouseClick).Action = ppActionRunMacro
   printButton.ActionSettings(ppMouseClick).Run = "PrintResults"
   ActivePresentation.SlideShowWindow.View.Next
   ActivePresentation.Saved = True
End Sub
```

Other than using the `answer` array, the main change to this procedure is that we must loop through all the answers so we can display them. We cannot put a line for each answer, as we have done in the past, because we do not know how many questions we will have. Instead, we use a `For` loop to cycle through the answers and add them to the slide:

```
For i = 1 To numQuestions
   printableSlide.Shapes(2).TextFrame.TextRange.Text = _
      printableSlide.Shapes(2).TextFrame.TextRange.Text & _
      "Question " & i & ": " & answer(i) & Chr$(13)
Next i
```

In English, this code says: For each answer in the `answer` array, take all the text we have already put in shape 2 of the slide (`printableSlide.Shapes(2).TextFrame.TextRange.Text`) and add (&) to that the question number (`"Question " & i`) and the answer with a new line (`answer(i) & Chr$(13)`). After the `For` loop, we also add to all of that the score and the instructions for printing the slide.

Finally, if you are using a version of PowerPoint that does not automatically change the size of the text to fit the text box, you will want to be sure to change the size of the text so you can fit more than three or four answers on the slide:

```
printableSlide.Shapes(2).TextFrame.TextRange.Font.Size = 9
```

Just change the `9` to a smaller number if you have more questions.

As a scripter, your burning question should be: How do I add questions to my presentation? If you have put all the previous code in your presentation, you must do the following things to add questions:

1. For each multiple-choice question, do not touch the VBA; just add the question slide and tie the button for the right answer to `RightAnswerButton` and the buttons for wrong answers to `WrongAnswerButton`.
2. For each short-answer question, add a slide with the question and tie the question button to a new procedure that is exactly like `Question3`, except that it will have a different number for the name of the procedure (`Question4`, `Question5`, etc.) and it will change the text of the

question in the InputBox statement and the correct answer(s) to check for in the If statement.

3. If you have a lot of questions, change the font size of the text box in the PrintablePage procedure to 9 or smaller.

Random Numbers

Random numbers are a powerful tool. Often you know exactly what you want in your presentation and in exactly what order. At other times you want to mix things up randomly. For example, you might want to practice addition facts, but you don’t want to specify every possible combination of one-digit numbers. Instead you want the computer to randomly generate problems for you. In another example, you might have a large pool of questions, but you only want to ask a few that are randomly selected. This section explores these examples.

To have the computer generate random numbers, you need to know three things: Randomize, Rnd, and Int. For you math purists, computers cannot generate truly random numbers, but they can come close enough for almost any purpose.

To be sure they are close enough for our purposes, we need to make sure that they are not the same every time. That is why we start with a Randomize statement. Just put this somewhere where it will be run before you need any random numbers (such as in your Initialize procedure). Imagine that the computer has a big deck of cards with numbers on them. When you ask for a random number, it picks the first card off the top of the deck and gives you the number on it. When you ask for another random number, it picks the next card. This deck of cards starts out in the same order every time, so every time you start the presentation and ask for a bunch of cards, you will get the same cards. This isn’t very good. What we need is to shuffle the cards. Randomize shuffles the cards. We only need to do this once when we run the presentation because the deck of cards is very large. That is why we do this in our Initialize procedure.

Next, we want to get a random number. This is done with the Rnd statement. You could have a procedure that includes:

```
myRandomNumber = Rnd
MsgBox myRandomNumber
```

This will pop up a MsgBox with a random number in it. The problem is that the number that is generated is somewhere between 0 and 1. Normally, we want random numbers that are positive integers (you know, 1, 2, 3, 4, 5, 6, …). Have no fear. That is where Int comes in. Int takes a real number and chops off everything after the decimal point. For example, Int(3.1415926) returns 3, and Int(.4567) returns 0. We can generate a random number between 0 and 9 with:

```
myRandomDigit = Int(10 * Rnd)
```

By multiplying a number between 0 and 1 by 10, we get a number from 0 up to 9.99999999. By taking the `Int` of that we get 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9. We can get a random number in any range by using the following formula:

```
Int((upper – lower + 1) * Rnd + lower)
```

`upper` is the biggest number you would want, and `lower` is the smallest number you would want. For our 0 through 9 example, we would have `Int((9 – 0 + 1) * Rnd + 0)` or `Int(10 * Rnd + 0)` or just `Int(10 * Rnd)`. If we wanted numbers from 1 to 100, we would have `Int((100 – 1 + 1) * Rnd + 1)` or `Int(100 * Rnd + 1)`. If we wanted numbers from 50 to 100, we would have `Int((100 – 50 + 1) * Rnd + 50)` or `Int(51 * Rnd + 50)`. Don't worry if you don't quite understand the math; just use the simple formula, and you will be fine.

Randomly Generated Questions

Let's use random numbers with a simple example. In this example, we will want to randomly generate one-digit addition problems. We will have a title slide with a button linked to `GetStarted` and a question slide with a button linked to `RandomQuestion`. The code follows:

```
Sub GetStarted()
   Initialize
   ActivePresentation.SlideShowWindow.View.Next
End Sub

Sub Initialize()
   Randomize
End Sub

Sub RandomQuestion()
   Dim first As Integer
   Dim second As Integer
   first = Int(10 * Rnd)
   second = Int(10 * Rnd)
   answer = InputBox("What is " & first & " + " & second & "?")
   If answer = first + second Then
      MsgBox "Good job"
   Else
      MsgBox "Try to do better"
   End If
End Sub
```

`GetStarted` is the same as our usual `GetStarted`, although in this example we don't use the student's name so we don't call `YourName`. You could add the `Dim userName`, the `YourName` procedure, and appropriate references to userName in the calls to MsgBox if you want. Because we are not keeping track of anything, Initialize just shuffles the deck by calling Randomize.

The heart of the procedure is RandomQuestion. This generates two random numbers from 0 to 9 and stores them in the variables first and second. If you want them to be something other than from 0 to 9, use the earlier formula to figure it out. Next, it puts up an InputBox asking for the student to type the sum of those two numbers. Then, it checks to see whether the answer was right by comparing what was typed to first + second, which is the right answer. You can change this to multiplication or subtraction by using * or − instead of +. You can add a third variable to make this into a problem with three numbers. You can even display the problem in a text box by using some of the tools for manipulating text from Chapter 7. You might have an easier time formatting the numbers into columns if you use a text box or more than one text box.

Keeping Score

With some minor modifications, we can plug RandomQuestion into some of our other quizzes from Chapter 8. We'll start by keeping score. Start with the code from "Keeping Score" in Chapter 8 (see Figure 8.1, p. 123). Add the following RandomQuestion procedure (this is the same as the previous RandomQuestion procedure, except that it calls RightAnswer and WrongAnswer instead of just putting up a MsgBox):

```
Sub RandomQuestion()
   Dim first As Integer
   Dim second As Integer
   first = Int(10 * Rnd)
   second = Int(10 * Rnd)
   answer = InputBox("What is " & first & " + " & second & "?")
   If answer = first + second Then
      RightAnswer
   Else
      WrongAnswer
   End If
End Sub
```

Add Randomize to the Initialize procedure. Remove ActivePresentation.SlideShowWindow.View.Next from RightAnswer and WrongAnswer so it does not automatically advance to the next slide.

For this to work properly, you need three slides: a title slide, a question slide, and a feedback slide. The title slide has a button tied to GetStarted. The question slide has a button tied to RandomQuestion and a button that goes to the next slide. And the feedback slide has a button tied to Feedback.

If you are adventurous, you might try to eliminate the feedback slide and keep a running total in a text box on the slide. After each question, update the text in the text box. You already have the number of correct and incorrect answers stored in `numCorrect` and `numIncorrect`. You simply need to use this to update a text box after each question is answered.

Try Again: Answer Until It's Right

Next, we can try to force the student to answer until the question is right, only counting the first try. This time, start with the code from "Try Again: Answer Until It's Right" in Chapter 8. Make the exact same changes as earlier, except use this `RandomQuestion` procedure:

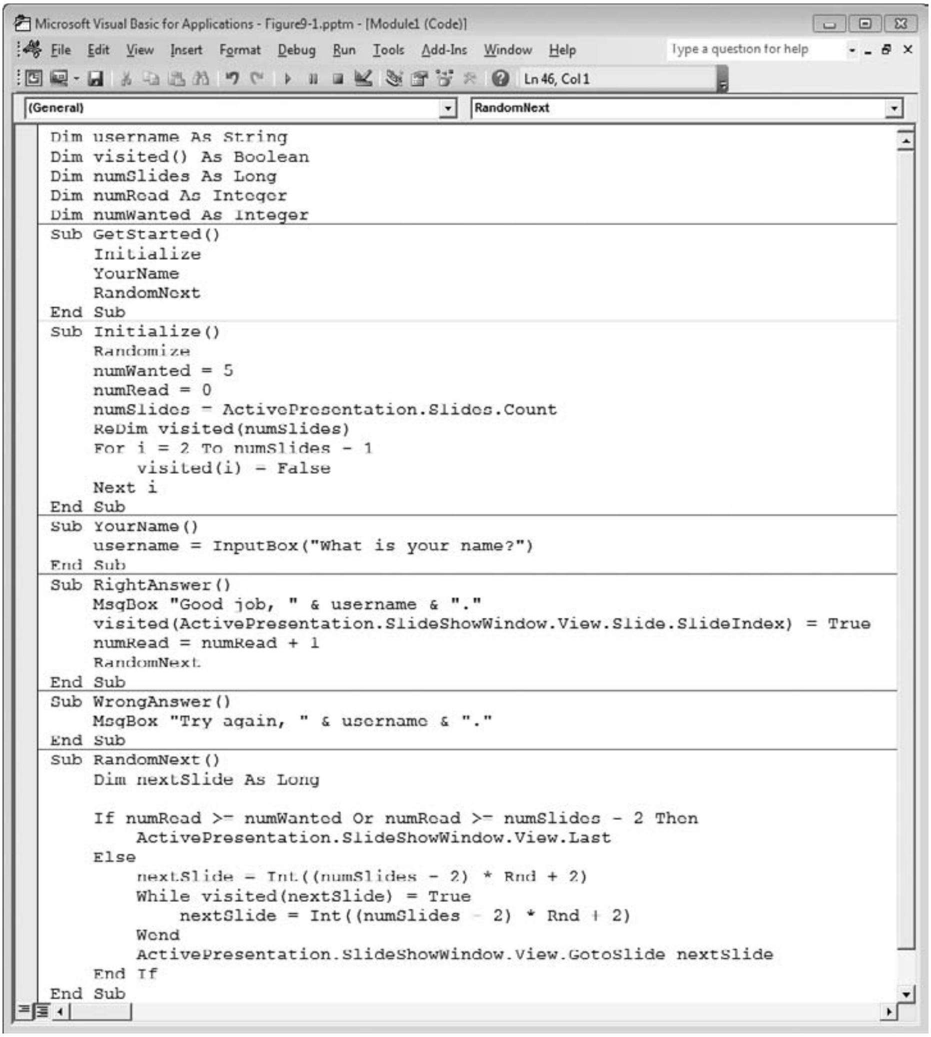
```
Sub RandomQuestion()
   Dim first As Integer
   Dim second As Integer
   Dim done As Boolean

   done = False
   first = Int(10 * Rnd)
   second = Int(10 * Rnd)
   While Not done
      answer = InputBox("What is " & first & " + " & second & "?")
      If answer = first + second Then
         RightAnswer
         done = True
      Else
         WrongAnswer
      End If
   Wend
End Sub
```

This uses a `While` loop similar to what is used for short-answer questions. The random numbers are generated before the `While` loop so that the same question is asked over and over again until it is answered correctly.

If you want to try to create a printable page with the results, you can try that on your own. Start with the version of that from this chapter in "Arrays." Keep in mind that simply listing the answers might not be helpful because the questions are randomly generated. You might want to add another array to keep track of the questions so you can add the questions and answers to your slide.

Choose Questions Randomly from a Pool

When my daughter was five, she was learning to read. Although I am generally opposed to computer use by five-year-olds, my daughter was fascinated with the computer, and I thought I could use it with her to help her read. I took the words she was working with in school and the reading sentences her teachers sent home and created a presentation. The presentation contains a few sentences and a multiple-choice question on each slide. Throughout the year, I added to the slides, but I did not want her to go through each slide every time. I wanted to limit her time on the computer, so I wanted the computer to randomly select five questions for her to answer. The presentation uses an array to keep track of which questions have been answered (so no question is repeated in each set of five) and random numbers to pick which question to present next. The code for this presentation can be found in Figure 9.1.


Microsoft Visual Basic for Applications - Figure9-1.pptm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
Ln 46, Col 1
(General)
RandomNext

```
Dim username As String
Dim visited() As Boolean
Dim numSlides As Long
Dim numRead As Integer
Dim numWanted As Integer
Sub GetStarted()
    Initialize
    YourName
    RandomNext
End Sub
Sub Initialize()
    Randomize
    numWanted = 5
    numRead = 0
    numSlides = ActivePresentation.Slides.Count
    ReDim visited(numSlides)
    For i = 2 To numSlides - 1
        visited(i) = False
    Next i
End Sub
Sub YourName()
    username = InputBox("What is your name?")
End Sub
Sub RightAnswer()
    MsgBox "Good job, " & username & "."
    visited(ActivePresentation.SlideShowWindow.View.Slide.SlideIndex) = True
    numRead = numRead + 1
    RandomNext
End Sub
Sub WrongAnswer()
    MsgBox "Try again, " & username & "."
End Sub
Sub RandomNext()
    Dim nextSlide As Long

    If numRead >= numWanted Or numRead >= numSlides - 2 Then
        ActivePresentation.SlideShowWindow.View.Last
    Else
        nextSlide = Int((numSlides - 2) * Rnd + 2)
        While visited(nextSlide) = True
            nextSlide = Int((numSlides - 2) * Rnd + 2)
        Wend
        ActivePresentation.SlideShowWindow.View.GotoSlide nextSlide
    End If
End Sub
```

Figure 9.1. VBA Code for Selecting Five Questions from a Pool of Questions

This presentation consists of a title slide, a last slide, and as many question slides as we want. The title slide has a button that is tied to the `GetStarted` procedure. The question slides have buttons for right and wrong answers that are tied to the `RightAnswer` and `WrongAnswer` procedures, respectively. The last slide has a button that is hyperlinked to the first slide (no VBA) and plays the applause sound. This version does not keep score.

The key elements of this presentation are the array `visited` and the procedure `RandomNext`. The array `visited` has a slot for each question. Actually, it has a slot for each slide, but the first and last slots are ignored. The slots are each set to `False` in `Initialize`. When a question is answered correctly, the slot of `visited` for that question is set to `True` in the `RightAnswer` procedure. In addition, one is added to `numRead`, a variable that keeps track of how many questions have been read.

`RandomNext` is used to go to the next question instead of `ActivePresentation.SlideShowWindow.View.Next`. In the past, the next question has always been the next slide. Now, we want to randomly select a slide, so we can't simply go to the next slide. `RandomNext` first checks to see whether we have answered five or more questions. Just in case the presentation doesn't have five questions, it also checks to be sure we haven't answered as many questions as there are:

```
If numRead >= numWanted Or numRead >= numSlides – 2 Then
```

`numWanted` was set in `Initialize` to be 5; that is, we want to ask five questions at a time. You can change that number in `Initialize` if you want to ask more or fewer than five questions at a time, or you can ask the user how many questions to do (see p. 192).

If we have asked enough questions, `RandomNext` jumps to the last slide. Otherwise, it randomly picks a new slide to jump to. Randomly picking another slide is very easy using `Rnd`, but we want to make sure we are jumping to a slide that we haven't seen yet. First we randomly pick a slide:

```
nextSlide = Int((numSlides – 2) * Rnd + 2)
```

This assigns the randomly chosen slide to `nextSlide`. The `While` loop keeps looping as long as we have seen the chosen slide (`visited(nextSlide) = True`). That is, if we pick slide 7 as our next slide, `visited(7)` will be `True` if we have seen slide 7, so we will keep looping, and pick another slide with `nextSlide = Int((numSlides – 2) * Rnd + 2)`. Once we have picked the next slide, we can go there with:

```
ActivePresentation.SlideShowWindow.View.GotoSlide nextSlide
```

That is all you need to choose a few questions from a pool of questions. To add more questions, you don't have to change any VBA at all; just add more question slides between the first and last slide. If you want to ask a different number of questions, you can either change numWanted = 5 to another number in the Initialize procedure, or you can try out the code in the next section to ask for the number of questions wanted.

This is a good place to remind you that you can and should use all the traditional PowerPoint tools at your disposal. For many of the questions I made for my daughter, I included pictures from clip art for the answers instead of regular buttons. I also used sounds liberally. The most important use of sound (aside from the applause at the end) is sound for difficult words or sentences. If I included a word or sentence that might be beyond my daughter's skills, I added a recorded sound of me reading the word or sentence. She knows that she can click on any speaker icon to have something read to her. While I am not a big fan of bells and whistles, you should use as many traditional features of PowerPoint as you think are appropriate.

Ask How Many Questions You Want

In the prior example, a simple line of VBA was used to determine the number of questions to be asked at a time. Perhaps you want the user to pick. To do this, simply replace numWanted = 5 with HowMany in the Initialize procedure, and add the following HowMany procedure:

```
Sub HowMany()
   done = False
   While Not done
      numWanted = InputBox("How many questions would you like?")
      If numWanted >= 1 And numWanted <= 10 Then
         done = True
      Else
         MsgBox "Pick a number from 1 to 10"
         done = False
      End If
   Wend
End Sub
```

The heart of this procedure is the InputBox statement. That is really all that is needed. However, my daughter might be inclined to type a very large number and get a lot of questions (so she can put off going to bed). The While checks to make sure the number chosen is between 1 and 10 inclusive. If you don't care what number is chosen, leave out the While loop. If you want to allow a different range of numbers, change the numbers in the While statement and the MsgBox.

Keeping Score

For my daughter at the age of five, I didn't keep score, but you might want to report a score at the end. Adding scorekeeping is not hard. We will need numCorrect and numIncorrect to be declared (Dim numCorrect and Dim numIncorrect) at the beginning of the module and initialized in the Initialize procedure (numCorrect = 0 and numIncorrect = 0), just like in any example that keeps score. Because we are asked to repeat a question until it is correct, we need qAnswered to be declared Dim qAnswered at the beginning of the module and initialized in the Initialize procedure (qAnswered = False). We will need a Feedback procedure to report the score and be called at the end. Finally, RightAnswer and WrongAnswer need to adjust the score if the question has been answered:

```
Sub RightAnswer()
   If qAnswered = False Then
      numCorrect = numCorrect + 1
   End If
   qAnswered = False
   MsgBox "Good job, " & username & "."
   visited(ActivePresentation.SlideShowWindow.View.Slide.SlideIndex) _
      = True
   numRead = numRead + 1
   RandomNext
End Sub

Sub WrongAnswer()
   If qAnswered = False Then
      numIncorrect = numIncorrect + 1
   End If
   qAnswered = True
   MsgBox "Try again, " & username & "."
End Sub
```

These are all the same changes that we made when we wanted to keep score in Chapter 8. You should be able to add short-answer questions by using the same Question procedures for each question that you used in Chapter 8.

You now have a powerful tool for randomly selecting slides. Note that these examples used quizzes, but if you understand this code, you can do something very similar to create a random story that picks random slides to go to next. The heart of this is RandomNext as well as the line:

```
visited(ActivePresentation.SlideShowWindow.View.Slide.SlideIndex) = True
```

Together, these will pick a random slide to go to next and mark that you have gone to that slide.

Conclusion

In this chapter you have developed a better understanding of a few VBA tricks we had already used, such as looping and `If` statements, and you learned several new tricks, including timed functions, arrays, and random numbers. These tricks are beginning to get more complicated than the earlier chapters, so if you don't understand how they work, you can simply type in the VBA code from the examples. If you do understand how they work, you can think of new things that you can do with these tricks—or at least modify the examples to suit your own purposes.

In the next chapter, we'll try a few more advanced tricks. Now that you might be writing some of your own code, or at least typing in long examples, you have a lot of opportunity to make mistakes. Mistakes are common in scripting and programming, and they are called bugs. Fixing mistakes is called debugging. In Chapter 11, you will learn some tricks to help you debug your code, that is, fix your mistakes.

Exercises to Try

- Create a template of a multiple-choice quiz using the code from this chapter. Teach three of your friends, colleagues, or students to create their own multiple-choice quizzes using your template. Remember that they don't have to change any of the VBA to do this.
- Create a template of a quiz with short-answer questions using the code from this chapter. Teach three of your friends, colleagues, or students to create their quizzes with short-answer questions using your template. Remember that they will have to edit the VBA, so you will have to teach them how to get to the VBA Editor, but they will only have to copy and paste your `Question` code and change the question number, the text of the question, and the answer to the question in VBA.
- Create your own random question quiz with randomly generated math problems. Use at least three different randomly generated numbers in each question.

10

Advanced Scripting Tricks

Introduction

In Chapter 9, you learned some advanced tricks, including several things that were a bit harder to understand but could simplify your code. This chapter will go off in a new direction with some additional advanced tricks. You will learn new ways to store information by using tags, how to read from and write to a text file to save results outside of PowerPoint or set up your presentation based on outside information, and how PowerPoint in VBA can communicate with Microsoft Excel.

Vocabulary

- Append
- Compiler directives
- Input
- Output
- State
- Tags

Tags

Up to this point, whenever we wanted to remember something, we have used variables. We have mostly used global variables (the ones that are declared with a `Dim` statement at the top of the module). Conceptually, this is very easy: if you want to remember something, make a variable and put what you want to remember in the variable; you can look at what's in the variable at any time. If you have made it to this point in the book, you have probably created some presentations with a lot of variables, and you might have a hard time keeping track of them.

Tags are another way of remembering things. The PPT FAQ suggests that tags are like invisible sticky notes (see http://www.pptfaq.com/FAQ00815.htm for more information about tags). Like sticky notes, you can put them on things. Any object in PowerPoint can have tags, and they can each have as many tags as you want. Remember that just about everything in PowerPoint is an object, so if you wanted to put a tag on any shape you could, and if you wanted to put a tag on a slide you could, and if you wanted to put a tag on a presentation you could.

Before we learn how to use tags, there are two important things to note about how tags differ from variables:

1. Variables go away while tags persist. That is, when you quit PowerPoint and come back to it, all the values in your variables are gone, but, assuming you saved the PowerPoint, the tags are still there remembering whatever you asked them to remember earlier.
2. Tags can only hold text values while variables can hold a wide range of different types of things (see Chapter 6). For most of our purposes, this is a small limitation because a number can be stored in text format, manipulated (by adding one to it, for example), and stored again in text format.

Remember that you have an unlimited supply of sticky notes called tags, and you can put them on any presentation, any slide, or any shape. Each tag has a name and a value. Both the name and the value are text, and you decide what the name is and what the value is. There can be only one tag on an object with a particular name so if you try to give a particular object a tag with the same name as one it already has, it just gets rid of the old one and replaces it with the new one.

What we need to know is how to set the value of a tag and how to get the value of a tag. Let's start with a tag for the entire presentation. Imagine you had created a game and wanted to keep track of the high score so the next time someone plays the game, they can try to beat the high score. If we just have a variable, named `highScore`, it would be reset as soon as we close the presentation. If we have a tag attached to the presentation, it would remain as long as the presentation is saved. Let's imagine the game has used the variable `currentScore` to keep track of the score. If we want to make `currentScore` the new high score, we can do the following:

```
ActivePresentation.Tags.Add "high score", currentScore
```

This says to get a sticky note, call it "high score," and put it on the presentation. Take whatever is in the variable `currentScore` and write that on the sticky note. If the presentation already has a sticky note named "high score," just replace it with this one.

We might want to look to see what the high score is. We can get whatever is currently written on the "high score" sticky note with

```
ActivePresentation.Tags("high score")
```

This returns a value that we can use, for example, to compare currentScore to whatever is on the “high score” sticky note and only replace it if currentScore is higher. For example:

```
Sub IsItHighScore()
   If currentScore > ActivePresentation.Tags("high score") Then
      ActivePresentation.Tags.Add "high score", currentScore
      MsgBox "You have the new high score"
   Else
      MsgBox "Sorry, you need to beat " & _
         ActivePresentation.Tags("high score")
   End If
   ActivePresentation.Save
End Sub
```

This checks to see if currentScore is greater than the high score. If it is, it makes currentScore the new high score and congratulates the user on having the new high score. If it isn’t, it tells the user what the high score to beat is. At the end, it saves the presentation so the new high score will be remembered even after the presentation is closed.

Note that the “high score” tag is of type String. It is important that currentScore is declared (with a Dim statement) as Integer or Long. This will probably happen at the top of the module. Otherwise, you are comparing a String to a String. That is, the comparison will be in alphabetical order, not numerical order. With numbers, 2 is greater than 1 and 100 is greater than 2. However, alphabetically, because 2 is greater than 1, 2 is greater than 100. By making currentScore an Integer or Long, the comparison will be numerical.

This is a game. We don’t just want to set the high score, we want to give credit for the high score holder. That’s easy, just pull out another sticky note and call it “high score name.” If you already have the user’s name stored in a variable, just use that. If not, use InputBox to ask for a name before adding the tag.

```
Sub IsItHighScore()
   Dim userName as String 'Add only if you don't have userName already
   If currentScore > ActivePresentation.Tags("high score") Then
      ActivePresentation.Tags.Add "high score", currentScore
      'Add the following line if you don't have userName already
      'userName = _
```

```
         InputBox("You have the new high score. What is your name?")
      'Use the following line if you already have userName
      MsgBox "You have the new high score, " & userName
      ActivePresentation.Tags.Add "high score name", userName
   Else
      MsgBox "Sorry, you need to beat " & _
         ActivePresentation.Tags("high score name") & _
         " who has a score of " & _
         ActivePresentation.Tags("high score")
   End If
   ActivePresentation.Save
End Sub
```

There is just one more thing we need to add to make this work. We need to make sure that the tag exists. Otherwise comparing `currentScore` to `highScore` will cause an error. That is because looking at a tag that does not exist returns the empty string, and we can't compare a number to the empty string. So, in our `Initialize` procedure, we should check to make sure that the "high score" tag exists:

```
Sub Initialize()
   If ActivePresentation.Tags("high score") = "" Then
      ActivePresentation.Tags.Add "high score", 0
      ActivePresentation.Tags.Add "high score name", "no one"
      End If
End Sub
```

This compares the "high score" tag to the empty string. If it is empty (in which case it doesn't exist), we'll set it to 0 and set the "high score name" tag to "no one."

Two things to note:

1. This only works if the presentation is stored in a place where the users can save it. If it is on a read-only network drive, for example, the tags won't be saved when the user quits.
2. The high score is kept in the presentation so if the presentation is copied to several computers in a lab, each computer will maintain a different high score.

Now, you have a complete mechanism for keeping a high score that will work even after the presentation is closed. All you need is to declare `currentScore` at the top of the module and have your game set `currentScore` while the user is playing and call `IsItHighScore` when the game is over.

More Tags

Another use for tags is to keep track of attributes of things, particularly things that might change and need to be changed back. This could be done with variables (assuming you don't want to change them back after the presentation is closed and reopened), but tags make more sense. If you were moving desks around in your classroom and you wanted to move them back, you might keep a list of where each desk goes, but it might make more sense to put a sticky note on each desk so you don't have to coordinate the list with the desks. The list would be like using variables while the sticky note is like using tags.

This might be useful, for example, if you are using 2007 and the `.Visible` property is not working. In Chapter 7, we put the location of an object directly in our code. We might use tags instead. For example:

```
Sub HideBox()
   With ActivePresentation.Slides(1).Shapes("Box")
      If Tags("top") = "" Then
         .Tags.Add "top", Top
      End If
      .Top = -2000
   End With
End Sub

Sub ShowBox()
   With ActivePresentation.Slides(1).Shapes("Box")
      .Top = Tags("top")
   End With
End Sub
```

This example assumes there is a shape named "Box" on slide 1 in the presentation. `HideBox` checks to see if that shape has a tag named "top." If it doesn't, it creates the tag and puts the current value of `.Top` (the top coordinate of the shape) in the tag. Then, it moves the shape off the viewable area of the slide by changing `.Top` to `-2000`. `ShowBox` simply takes whatever is in the tag named "top" and moves the shape back to that location.

Stop in the Middle: Saving State

You might be creating complex projects that take more than one day to complete. Imagine a 1,000-question quiz. The basic code for the quiz starts with what we saw in Chapter 8 or Chapter 9. What if the student quits after question 500? We will want to save the *state* of the quiz, that is, all the information we need to get back right to the same place we were before. If we're not keeping score, the entire state consists of which slide we stopped on. For a simple quiz with a score, we just need to remember the score and the last question the student completed. Let’s start with the second example in Chapter 8 (see “Try Again: Answer Until It’s Right”) and add to that:

```
Dim numCorrect As Integer
Dim numIncorrect As Integer
Dim userName As String
Dim qAnswered As Boolean

Sub GetStarted()
   Initialize
   YourName
   RestoreState 'ADDED
End Sub

Sub Initialize()
   numCorrect = 0
   numIncorrect = 0
   qAnswered = False
End Sub

Sub YourName()
   userName = InputBox("Type your name")
End Sub

Sub SaveState() 'ADDED
   ActivePresentation.Tags.Add "current slide", _
      ActivePresentation.SlideShowWindow.View.Slide.SlideIndex
   ActivePresentation.Tags.Add "number correct", numCorrect
   ActivePresentation.Tags.Add "number incorrect", numIncorrect
   ActivePresentation.Save
End Sub

Sub ClearState() 'ADDED
   ActivePresentation.Tags.Delete "current slide"
End Sub

Sub RestoreState() 'ADDED
   Dim keepGoing As Long
   If ActivePresentation.Tags("current slide") = "" Then
      'Nothing is saved. Just go to the next slide.
      ActivePresentation.SlideShowWindow.View.Next
   Else
      keepGoing = _
         MsgBox("Do you want to pick up where you left off?", vbYesNo)
      If keepGoing = vbNo Then
         'User said no. Start over.
         ClearState
         ActivePresentation.SlideShowWindow.View.Next
      Else
```

```
         'User said yes. Continue where user left off.
         ActivePresentation.SlideShowWindow.View.GotoSlide _
            ActivePresentation.Tags("current slide")
         numCorrect = ActivePresentation.Tags("number correct")
         numIncorrect = ActivePresentation.Tags("number incorrect")
      End If
   End If
End Sub

Sub RightAnswer()
   If qAnswered = False Then
      numCorrect = numCorrect + 1
   End If
   qAnswered = False
   MsgBox "You are doing well, " & userName
   ActivePresentation.SlideShowWindow.View.Next
   SaveState 'ADDED
End Sub

Sub WrongAnswer()
   If qAnswered = False Then
      numIncorrect = numIncorrect + 1
   End If
   qAnswered = True
   MsgBox "Try to do better next time, " & userName
End Sub

Sub Question3()
   Dim answer As String
   answer = InputBox(prompt:="What is the capital of Maryland?", _
      Title:="Question 3")
   answer = Trim(answer)
   answer = LCase(answer)
   If answer = "annapolis" Or _
      answer = "anapolis" Or _
      answer = "annappolis" Or _
      answer = "anappolis" Then
      RightAnswer
   Else
      WrongAnswer
   End If
End Sub

Sub Feedback()
   MsgBox "You got " & numCorrect & " out of " _
      & numCorrect + numIncorrect & ", " & userName
   ClearState 'ADDED
   ActivePresentation.SlideShowWindow.View.GotoSlide 1 'ADDED
End Sub
```

The heart of this example is the three new procedures: SaveState, ClearState, and RestoreState. SaveState sets tags for the presentation with number of correct answers, the number of incorrect answers, and the current slide, and it saves the presentation. ClearState deletes the tag for the current slide, which tips off RestoreState that there is nothing saved to restore. RestoreState is a little complicated because it needs to check first if there is nothing saved to restore (If ActivePresentation.Tags("current slide") = "" Then). If there is nothing, just go to the next slide, which will be the first question. If there is something, then RestoreState asks if you want to pick up where you left off. If you click "No" in the MsgBox, it will clear the state and go to the next slide. If you click "Yes," it will restore the values of numCorrect and numIncorrect (returning the score to what it was) and take you to the slide saved in the "current slide" tag.

SaveState is called after every right answer (if we add some code to save the value of qAnswered, we might call it after wrong answers as well). ClearState is called at the end of the presentation (after the feedback is given) and at the beginning if the user clicked "No" to not continue where the presentation left off. RestoreState is called at the beginning (in the GetStarted procedure) to get back to where the user was if necessary.

As your project gets more complicated, SaveState and RestoreState might get more complicated, keeping track of more things, including anything stored in a variable as well as which shapes should be set to be hidden or shown.

Writing to a File

Tags are useful for saving information within the PowerPoint file. You also might want to read or write information outside of PowerPoint, such as to a text file. This might, for example, be a good way to keep a list of everyone's results so the teacher can review all of them in one place. You can either create a new text file each time someone answers or append the results to an existing text file. We can take the example from Chapter 8 ("How Did You Do: Reporting Results to the Teacher," pp. 136–145) and add a few lines of code to the PrintablePage procedure. The section that was added is preceded by a comment.

```
Sub PrintablePage()
   Dim printableSlide As Slide
   Dim homeButton As Shape
   Dim printButton As Shape

   Set printableSlide = _
      ActivePresentation.Slides.Add(Index:=printableSlideNum, _
      Layout:=ppLayoutText)
   printableSlide.Shapes(1).TextFrame.TextRange.Text = _
      "Results for " & userName
   printableSlide.Shapes(2).TextFrame.TextRange.Text = _
```

```
      "Your Answers" & Chr$(13) & _
      "Question 1: " & answer1 & Chr$(13) & _
      "Question 2: " & answer2 & Chr$(13) & _
      "Question 3: " & answer3 & Chr$(13) & _
      "You got " & numCorrect & " out of " & _
      numCorrect + numIncorrect & "." & Chr$(13) & _
      "Press the Print Results button to print your answers."

   'Code below is added to write answers to a file named myTestFile.txt
   'This overwrites whatever is in the file. To append to the file
   'just change For Output to For Append in the line below
   Open ActivePresentation.Path & "\" & "myTestFile.txt" For Output As #1
   'Use the line below for a Macintosh instead of the line above
   'Open ActivePresentation.Path & ":" & "myTestFile.txt" For Output As #1
   Write #1, "Results for " & userName
   Write #1, "Your Answers"
   Write #1, "Question 1: " & answer1
   Write #1, "Question 2: " & answer2
   Write #1, "Question 3: " & answer3
   Write #1, _
      "You got " & numCorrect & " out of " & _
      numCorrect + numIncorrect & "."
   Close #1

   Set homeButton = _
      ActivePresentation.Slides(printableSlideNum).Shapes.AddShape _
      (msoShapeActionButtonCustom, 0, 0, 150, 50)
   homeButton.TextFrame.TextRange.Text = "Start Again"
   homeButton.ActionSettings(ppMouseClick).Action = ppActionRunMacro
   homeButton.ActionSettings(ppMouseClick).Run = "StartAgain"
   Set printButton = _
      ActivePresentation.Slides(printableSlideNum).Shapes.AddShape _
      (msoShapeActionButtonCustom, 200, 0, 150, 50)
   printButton.TextFrame.TextRange.Text = "Print Results"
   printButton.ActionSettings(ppMouseClick).Action = ppActionRunMacro
   printButton.ActionSettings(ppMouseClick).Run = "PrintResults"
   ActivePresentation.SlideShowWindow.View.Next
   ActivePresentation.Saved = True
End Sub
```

In this example, the `Open` command is used to open a file. `For Output` means that the file will be opened for writing and will overwrite whatever was in the file. You could use `For Append` to add to the end of the file and keep a file of everyone's results. Also, `ActivePresentation.Path & "\" & "myTestFile.txt"` is used to put the file named `myTestFile.txt` in the same folder as the PowerPoint file. If you want it someplace else, you can just replace that with the full path of the file (e.g., `C:\myGreatFile.txt`). The `#1` at the end of the `Open` line allows us to refer to this as file #1 later.

The `Write` command is used to write to the file, and it writes whatever follows it on a new line so each of the things we had written to the slide are written to a new line in the file. Finally, when we are done with a file, we need to close it using the `Close` command. In the next section, we'll use the `Open` command with `For Input` to read from a file.

In this example, we used one of our earlier quizzes to write the results to a file. However, the same ideas could be used to write anything to a file: you could just write the user's name and score; you could create a survey and write the answers to the survey; you could write the number of the last slide the user visited. In other words, you can write any text you want to a text file. Here's a simple example that asks for a name and address and appends that information to a file named "addressFile.txt":

```
Sub AddName()
   Dim yourName As String
   Dim yourAddress As String
   Dim cityStateZip As String

   Open ActivePresentation.Path & "\" & "addressFile.txt" _
   For Append As #1
   'For Macintosh, use : instead of \ in the above line
   yourName = InputBox("Type your name")
   yourAddress = InputBox("Type your street address")
   cityStateZip = InputBox("Type your city, state, and zip code")
   Write #1, yourName
   Write #1, yourAddress
   Write #1, cityStateZip
   Close #1
End Sub
```

You have now seen a couple of examples that require the code to be slightly different for a Macintosh than for Windows. This could be a problem if you have a PowerPoint file that you want to run on either Macintosh or Windows and don't want to change your code. There is a solution. There is a special class of statements that are *compiler directives*. They tell the compiler how to interpret something. These special statements start with the number sign (#). You can use the following to have the compiler use one line if the computer that is running PowerPoint is a Macintosh and a different one if it is not:

```
#If Mac Then
   Open ActivePresentation.Path & ":" & "addressFile.txt" _
     For Append As #1
```

```
#Else
   Open ActivePresentation.Path & "\" & "addressFile.txt" _
     For Append As #1
#End If
```

If you put this in the `AddName` procedure instead of using one `Open` line for Windows and changing it for the Macintosh, your code should work on either platform without change.

Reading from a File

In the previous example, we wrote our results to a text file. We might want PowerPoint to be able to read from a text file as well. This could be used to restore settings (like what we did with tags) or read in configuration options.

As an example of this, you might have a test bank with questions and answers stored in a text file that PowerPoint could read. This could be powerful because you could create a PowerPoint file and have others edit the text file without changing anything in the PowerPoint. All they need to know are the details of the format of the text file.

For this example, our PowerPoint file is only going to have two slides: a title slide with a button linked to `GetStarted` and a feedback slide with a button linked to `PrintablePage`. Note that this could work with any of the multiple-choice examples, including simpler examples that just keep score and more complex examples that write the results to a file. This example does not work with short-answer questions. Doing that would require a fair amount of complexity. It is possible with the things you have learned in this book but too complicated to include here.

Because the code is getting fairly complex, you can see all the following code even though many of the pieces are the same as previous examples. Changes from previous examples are marked with comments.

```
Dim numCorrect As Integer
Dim numIncorrect As Integer
Dim userName As String
Dim qAnswered() As Boolean 'Array to store if the question was answered
Dim answer() As String 'Array to store answers
Dim numQuestions As Long
Dim printableSlideNum As Long

Sub GetStarted()
   YourName
   Initialize
   ActivePresentation.SlideShowWindow.View.Next
End Sub
```

```
Sub YourName()
   userName = InputBox("What is your name?")
End Sub

Sub Initialize()
   Dim i As Long

   numCorrect = 0
   numIncorrect = 0
   AddQuestionsFromFile 'ADDED
   printableSlideNum = ActivePresentation.Slides.Count + 1
   numQuestions = ActivePresentation.Slides.Count – 2
   ReDim qAnswered(numQuestions)
   ReDim answer(numQuestions)
   For i = 1 To numQuestions
      qAnswered(i) = False
   Next i
End Sub

Sub AddQuestionsFromFile() 'ADDED
   Dim nextLine As String
   Dim oSld As Slide
   Dim oShp As Shape
   Dim nextSlideNum As Long
   Dim nextAnswerNum As Long

   'Open the file in the same folder as the PowerPoint file
   Open ActivePresentation.Path & "\" & "questions.txt" For Input As #1
   'Use the following line and not the previous on a Mac
   'Open ActivePresentation.Path & ":" & "questions.txt" For Input As #1
   nextSlideNum = 1
   nextAnswerNum = 1
   Do Until EOF(1)
      Input #1, nextLine
      If Left$(nextLine, 1) = "Q" Then 'It's a question
         nextSlideNum = nextSlideNum + 1
         Set oSld = _
            ActivePresentation.Slides.AddSlide(nextSlideNum, _
            ActivePresentation.SlideMaster.CustomLayouts(2))
         oSld.Shapes(1).TextFrame.TextRange.Text = _
            Trim(Right$(nextLine, Len(nextLine) – 1))
         nextAnswerNum = 1
      ElseIf Left$(nextLine, 1) = "R" Then 'Right answer
         Set oShp = ActivePresentation.Slides(nextSlideNum).Shapes _
            .AddShape(msoShapeActionButtonCustom, 100, _
            120 + (85 * (nextAnswerNum – 1)), 500, 75)
         oShp.TextFrame.TextRange.Text = _
            Trim(Right$(nextLine, Len(nextLine) – 1))
         oShp.ActionSettings(ppMouseClick).Action = ppActionRunMacro
         oShp.ActionSettings(ppMouseClick).Run = "RightAnswerButton"
         nextAnswerNum = nextAnswerNum + 1
      ElseIf Left$(nextLine, 1) = "W" Then 'Wrong answer
         Set oShp = ActivePresentation.Slides(nextSlideNum).Shapes _
            .AddShape(msoShapeActionButtonCustom, 100, _
            120 + (85 * (nextAnswerNum – 1)), 500, 75)
         oShp.TextFrame.TextRange.Text = _
            Trim(Right$(nextLine, Len(nextLine) – 1))
         oShp.ActionSettings(ppMouseClick).Action = ppActionRunMacro
         oShp.ActionSettings(ppMouseClick).Run = "WrongAnswerButton"
         nextAnswerNum = nextAnswerNum + 1
      ElseIf Trim(nextLine) = "" Then
         'Ignore blank lines
      Else
         MsgBox _
            "Sorry, I don't know what to do with: " _
            & Chr$(13) & nextLine
      End If
   Loop
   Close #1
End Sub

Sub RightAnswerButton(answerButton As Shape)
   Dim thisQuestionNum As Long
   thisQuestionNum = _
      ActivePresentation.SlideShowWindow.View.Slide.SlideIndex – 1
   If qAnswered(thisQuestionNum) = False Then
      answer(thisQuestionNum) = answerButton.TextFrame.TextRange.Text
      'Use the following line to work around the Mac bug
      'answer(thisquestionNum) = _
         answerButton.Parent.Shapes(answerButton.Name) _
         .TextFrame.TextRange.Text
   End If
   RightAnswer
End Sub

Sub RightAnswer()
   Dim thisQuestionNum As Long
   thisQuestionNum = _
      ActivePresentation.SlideShowWindow.View.Slide.SlideIndex – 1
   If qAnswered(thisQuestionNum) = False Then
      numCorrect = numCorrect + 1
   End If
   qAnswered(thisQuestionNum) = True
   MsgBox "You are doing well, " & userName
   ActivePresentation.SlideShowWindow.View.Next
End Sub

Sub WrongAnswerButton(answerButton As Shape)
   Dim thisQuestionNum As Long
   thisQuestionNum = _
      ActivePresentation.SlideShowWindow.View.Slide.SlideIndex – 1
   If qAnswered(thisQuestionNum) = False Then
      answer(thisQuestionNum) = answerButton.TextFrame.TextRange.Text
      'Use the following line to work around the Mac bug
      'answer(thisquestionNum) = _
         answerButton.Parent.Shapes(answerButton.Name) _
         .TextFrame.TextRange.Text
   End If
   WrongAnswer
End Sub

Sub WrongAnswer()
   Dim thisQuestionNum As Long
   thisQuestionNum = _
      ActivePresentation.SlideShowWindow.View.Slide.SlideIndex – 1
   If qAnswered(thisQuestionNum) = False Then
      numIncorrect = numIncorrect + 1
   End If
   qAnswered(thisQuestionNum) = True
   MsgBox "Try to do better next time, " & userName
End Sub

Sub PrintablePage()
   Dim printableSlide As Slide
   Dim homeButton As Shape
   Dim printButton As Shape

   Set printableSlide = _
      ActivePresentation.Slides.Add(Index:=printableSlideNum, _
      Layout:=ppLayoutText)
   printableSlide.Shapes(1).TextFrame.TextRange.Text = _
      "Results for " & userName
   printableSlide.Shapes(2).TextFrame.TextRange.Text = _
      "Your Answers" & Chr$(13)
   For i = 1 To numQuestions
      printableSlide.Shapes(2).TextFrame.TextRange.Text = _
         printableSlide.Shapes(2).TextFrame.TextRange.Text & _
         "Question " & i & ": " & answer(i) & Chr$(13)
   Next i
   printableSlide.Shapes(2).TextFrame.TextRange.Text = _
      printableSlide.Shapes(2).TextFrame.TextRange.Text & _
      "You got " & numCorrect & " out of " & _
      numCorrect + numIncorrect & "." & Chr$(13) & _
      "Press the Print Results button to print your answers."
   printableSlide.Shapes(2).TextFrame.TextRange.Font.Size = 9
   Set homeButton = _
      ActivePresentation.Slides(printableSlideNum).Shapes _
      .AddShape(msoShapeActionButtonCustom, 0, 0, 150, 50)
   homeButton.TextFrame.TextRange.Text = "Start Again"
   homeButton.ActionSettings(ppMouseClick).Action = ppActionRunMacro
   homeButton.ActionSettings(ppMouseClick).Run = "StartAgain"
   Set printButton = _
      ActivePresentation.Slides(printableSlideNum).Shapes _
      .AddShape(msoShapeActionButtonCustom, 200, 0, 150, 50)
   printButton.TextFrame.TextRange.Text = "Print Results"
   printButton.ActionSettings(ppMouseClick).Action = ppActionRunMacro
   printButton.ActionSettings(ppMouseClick).Run = "PrintResults"
   ActivePresentation.SlideShowWindow.View.Next
   ActivePresentation.Saved = True
End Sub

Sub PrintResults()
   ActivePresentation.PrintOptions.OutputType = ppPrintOutputSlides
   ActivePresentation.PrintOut From:=printableSlideNum, _
      To:=printableSlideNum
End Sub

Sub StartAgain()
   ActivePresentation.SlideShowWindow.View.GotoSlide 1
   ActivePresentation.Slides(printableSlideNum).Delete
   While ActivePresentation.Slides.Count > 2 'Delete inserted slides
      ActivePresentation.Slides(2).Delete
   Wend
   ActivePresentation.Saved = True
End Sub
```

The first thing to note about this is that we don't know how many questions there are in advance because we are reading them from a file. Because this example keeps track of each answer, we must use the printable slide example from Chapter 9 (that uses arrays) rather than the example from Chapter 8 (that uses a different variable for each answer). However, for simpler examples that don't need to keep track of each answer and only allow you to answer once or until you get it right (and not go back), this concept can work with the examples in Chapter 8.

The most significant addition to the code is the procedure `AddQuestionsFromFile`. This procedure is called from the `Initialize` procedure so it runs upon clicking the button on the first slide. This looks for a file named `questions.txt` in the folder where the PowerPoint file is and opens it `For Input` so you can read from it but not write to it:

```
Open ActivePresentation.Path & "\" & "questions.txt" For Input As #1
```

Note that you can possibly leave off the `ActivePresentation.Path & "\" &` and still look for the file in the current directory, but that works inconsistently so we include that to ensure we are looking in the current folder. Also, because the Macintosh operating system uses `:` instead of `\` to separate parts of a file path, you have to change the `\` to a `:` for this to work on a Macintosh.

The `Do` loop:

```
Do Until EOF(1)
   …
Loop
```

loops until file #1 (the file we just opened) reaches the end, reading each line of the file one-by-one into the variable `nextLine`.

In this example, the format of the file has each new question start with Q, followed by the right and wrong answers. Each right answer starts with R, and each wrong answer starts with W. For example, the file might look like the following.

```
Q What is 1+1?
W 4
R 2
W 1
Q Who was the first president of the United States?
R George Washington
W Abraham Lincoln
W Barack Obama
```

Because there are three possible things the line can start with, the `If` asks if the line starts with a Q, starts with an R, or starts with a W. It also checks to see if the line is blank (so it can skip it). If it is none of those, it puts up a `MsgBox` to say that it didn't understand the line.

If the line starts with a Q, it means that we have a new question. That means we need to add a new slide.

```
Set oSld = _
   ActivePresentation.Slides.AddSlide(nextSlideNum, _
   ActivePresentation.SlideMaster.CustomLayouts(2))
```

This creates a slide using the second slide layout, which is usually a Title and Content slide. This works for PowerPoint 2007, 2010, and 2011. If you use an earlier version of PowerPoint, you will have to use the Add method, not the AddSlide method. The location of the slide is stored in nextSlideNum, which starts at 1 and increases before every question slide is added (so the first slide added will be 2, then 3, etc.).

Because we have just added a slide for the question, we want to add the text for the question to the title area of the slide oSld.Shapes(1). That will get set to the text that was just read in. However, that text always starts with a Q (or R or W) so we want to strip that off, which is what Trim(Right$(nextLine, Len(nextLine) – 1)) does. It figures out how many characters are in nextLine (Len(nextLine)), subtracts 1, takes the rightmost characters (i.e., all but the first character), and trims off any blank spaces. You can certainly use this line without understanding it, but if you want to do something more complex than just a single character to signal what the line means, you'll need to adjust this. Finally, since we are starting a new question, it sets nextAnswerNum to 1 because the next answer will be the first one for this question.

The code for a right answer and a wrong answer is identical, except that the buttons for right answers are set to run the procedure RightAnswerButton and the buttons for wrong answers are set to run the procedure WrongAnswerButton. Note that if you were using a simpler example that didn't keep track of right and wrong answers, you would probably have the buttons set to run RightAnswer and WrongAnswer.

The code adds a button and sets the variable oShp to point to it. The code is set up to create buttons that are lined up with each one below the next so the line has to calculate where to put each button. This code sets the buttons to have 10 pixels between them and be 75 pixels tall so each button must be at some multiple of 85 pixels below the first one. If you want smaller buttons, you can play with the numbers in:

```
Set oShp = ActivePresentation.Slides(nextSlideNum).Shapes _
   .AddShape(msoShapeActionButtonCustom, 100, _
   120 + (85 * (nextAnswerNum – 1)), 500, 75)
```

Next we have to set the text on the button (now referred to as oShp) to the text that was just read from the file (without the W or R at the beginning).

```
oShp.TextFrame.TextRange.Text = _
   Trim(Right$(nextLine, Len(nextLine) – 1))
```

Next, we set the newly added button to run the procedure RightAnswerButton or WrongAnswerButton when clicked:

```
oShp.ActionSettings(ppMouseClick).Action = ppActionRunMacro
oShp.ActionSettings(ppMouseClick).Run = "RightAnswerButton"
```

Finally, we add one to `nextAnswerNum` so the next button will be 85 pixels below this one.

```
nextAnswerNum = nextAnswerNum + 1
```

After the loop, we need to be sure to close the file with `Close #1`.

The only other new thing in the code is in the `StartAgain` procedure. Because the questions are read in from a file, `StartAgain` not only deletes the printable slide, but it also deletes all the question slides:

```
While ActivePresentation.Slides.Count > 2 'Delete inserted slides
   ActivePresentation.Slides(2).Delete
Wend
```

It simply loops through the slides, deleting slide number 2 as long as there are more than two slides. Once there are only two slides (the first one and the last one), it will stop deleting slides.

This example works very well for someone who is careful about constructing the file with the questions. However, be aware that it does not contain a lot of error checking for the kinds of mistakes someone might make, so it is possible to create a file of questions that doesn't work at all. The rules (start questions with Q, right answers with R, and wrong answers with W; and put each question and each answer on one line) are fairly simple, but someone is sure to create a file that just doesn't work (e.g., starting the file with an answer and not a question is sure to give strange results).

Communicating with Excel

Text files are very useful and, as you can see from the prior examples, can be used to do some interesting things. But when was the last time you wrote a text file? You are more likely to want to read from and write to an Excel file. This section will introduce you to how to get PowerPoint to talk to Excel.

To fully understand how to communicate with Excel, you would need a strong understanding of the details of the object model in Excel. For most things, it's a bit simpler than what we have seen in PowerPoint. However, this chapter is going to stick to the briefest introduction to communicating between PowerPoint and Excel, so you should be able to do a few things but probably just enough to make you want to learn more.

In PowerPoint, we are used to thinking about shapes that are on slides in a presentation, accessing them with something like:

```
ActivePresentation.Slides("MenuSlide").Shapes("QuizButton")
```

In Excel, we don't have slides and shapes (actually, you can have shapes, but we won't get into that). Instead, you have cells that are on worksheets that are in workbooks. For example, you might have:

```
ActiveWorkbook.Worksheets(1).Range("A1")
```

to refer to cell A1 in the first worksheet in the current Excel file. To set that cell to something—the number 26, for example—you can do the following

```
ActiveWorkbook.Worksheets(1).Range("A1") = 26
```

With commands like that, all we need to do is get a pointer to an Excel workbook, open, and we can read and write to various cells to our heart's content.

Here's a bit of code that can be used to save the results to an Excel file. This example adds a line in the spreadsheet with the name, number correct, number incorrect, and percentage for each student:

```
Sub SaveToExcel()
   Dim oXLApp As Object
   Dim oWb As Object
   Dim row As Long

   Set oXLApp = CreateObject("Excel.Application")
   'On a Mac change \ to: in the following line
   Set oWb = oXLApp.Workbooks.Open(ActivePresentation.Path & "\" _
      & "Results.xlsx")
   If oWb.Worksheets(1).Range("A1") = "" Then
      oWb.Worksheets(1).Range("A1") = "Name"
      oWb.Worksheets(1).Range("B1") = "Number Correct"
      oWb.Worksheets(1).Range("C1") = "Number Incorrect"
      oWb.Worksheets(1).Range("D1") = "Percentage"
   End If

   'Loop past all the rows that already have stuff in them
   row = 2
   While oWb.Worksheets(1).Range("A" & row) <> ""
      row = row + 1
   Wend

   oWb.Worksheets(1).Range("A" & row) = userName
   oWb.Worksheets(1).Range("B" & row) = numCorrect
   oWb.Worksheets(1).Range("C" & row) = numIncorrect
   oWb.Worksheets(1).Range("D" & row) = _
        100 * (numCorrect / (numCorrect + numIncorrect))

   oWb.Save
   oWb.Close
End Sub
```

This works with any of the examples that save a name in `userName`, the number of correct answers in `numCorrect`, and the number of incorrect answers in `numIncorrect`. Simply call this procedure from whatever reports the result. For example, you could add this to the `Feedback` procedure in any of the first several examples in Chapter 8:

```
Sub Feedback()
   MsgBox "You got " & numCorrect & " out of " _
      & numCorrect + numIncorrect & ", " & userName
   SaveToExcel 'ADDED
End Sub
```

Note that this does not have a lot of error checking. It requires a file to exist named “Results.xlsx” in the same folder as the PowerPoint file, and it requires Excel to be closed. This is also a fairly simple connection between PowerPoint and Excel. For more information about connecting to Excel and other Office applications, you might consult the PPT FAQ (http://www.pptfaq.com/), including “Controlling Office Applications from PowerPoint” (http://www.pptfaq.com/FAQ00795.htm) and other articles by Naresh Nichani and Brian Reilly.

Let’s take a look at how this works. First the variables `oXLApp` and `oWb` are declared and become pointers to the Excel application and the specific workbook named “Results.xlsx”:

```
Set oXLApp = CreateObject("Excel.Application")
Set oWb = oXLApp.Workbooks _
   .Open(ActivePresentation.Path & "\" & "Results.xlsx")
```

Don’t forget that Macs require `:` instead of \ in the second line of this code.

Once we have a pointer to the workbook (`oWb`), we can access the first worksheet and any specific cell in that worksheet, such as cell A1. For example, we can ask if cell A1 is empty:

```
If oWb.Worksheets(1).Range("A1") = "" Then
```

If it is, we can set up the header information by putting “Name” in cell A1, “Number Correct” in cell B1, etc.:

```
oWb.Worksheets(1).Range("A1") = "Name"
oWb.Worksheets(1).Range("B1") = "Number Correct"
oWb.Worksheets(1).Range("C1") = "Number Incorrect"
oWb.Worksheets(1).Range("D1") = "Percentage"
```

Otherwise, we’ll assume the file is already set up and doesn’t need header information.

Because this example keeps a listing of everyone’s results, we then have to cycle through the rows until we find an empty one (or at least until the first cell in a row is empty):

```
row = 2
While oWb.Worksheets(1).Range("A" & row) <> ""
   row = row + 1
Wend
```

This just starts in row 2, adding one to the `row` variable each time through the loop. If the first cell in the row is empty (`Range("A" & row)` will refer to cell A2 when `row` is 2, A3 when `row` is 3, etc.), then we'll add one to `row` and loop again. When the loop exits, `row` is the number of the first empty row. Then, it is just a matter of writing the results to the first four cells in the empty row based on the contents of `userName`, `numCorrect`, `numIncorrect`, and a calculation to calculate the percentage:

```
oWb.Worksheets(1).Range("A" & row) = userName
oWb.Worksheets(1).Range("B" & row) = numCorrect
oWb.Worksheets(1).Range("C" & row) = numIncorrect
oWb.Worksheets(1).Range("D" & row) = _
100 * (numCorrect / (numCorrect + numIncorrect))
```

Finally, the last two lines save the Excel file and close it:

```
oWb.Save
oWb.Close
```

The same things you used here could be used to read data from an Excel file. In fact, we already did, just to test if certain cells were blank. While this doesn't cover every possible interaction between PowerPoint and Excel, it is enough to get you started. If you learn more Excel VBA (not the subject of this book), you could format spreadsheets, add charts, and much more.

Conclusion

In this chapter, you learned ways to have PowerPoint communicate beyond PowerPoint. Tags are powerful tools to save information in a PowerPoint file beyond the current session. Text files are a good way to keep a record outside of PowerPoint of what was done. And everyone loves to store data in Excel, so it is a great option for saving data for later manipulation. This is just the tip of the iceberg. With some practice and exploration, you can make PowerPoint do just about anything.

Exercises to Try

- Use what you learned about tags to keep the top five scores. This will require several tags and require you to move them around. For example, if someone gets the third highest score, then it doesn't merely replace the third highest score. Instead, the fourth highest score will become the fifth highest score, the third highest score will become the fourth highest score, and the current score will become the third highest score.
- Use tags to create a presentation with a menu that remembers which areas have been visited (like the last examples in Chapter 8) so the user can start again with the menu items checked that were visited the last time the presentation was run. As a bonus, try to include the hidden quiz button so the quiz button will show up when all the areas have been visited whether they were visited this session or last.
- Re-create the example in this chapter that reads questions from a text file so that it reads questions from an Excel file. You can decide how you want to format the file. Just be sure that you have a way to know which answer is the right answer and that the right answer is not always in the same position.

11

Debugging Tips

Introduction

In Chapter 9 you added to your bag of tricks, and in Chapter 10, you learned some advanced tricks. However, this chapter will be valuable as soon as you begin Chapter 7. Whether you are ready to venture out on your own, writing scripts that are more than minor modifications of the examples in this book, or are simply copying more and more complex examples, you are bound to make mistakes. This chapter describes several ways to track down your mistakes and avoid making mistakes in the first place, and it points you to some common mistakes for which you can look when your code seems like it should work, but it doesn't.

Vocabulary

- Break mode
- Bug
- Capitalization
- Compile error
- Commenting out
- Debug
- Error trapping
- Immediate window
- Indenting
- Line label
- Run-time error

My Scripts Always Work the First Time

If you have tried more than one or two examples in this book, you are almost certain to have made at least one mistake. In computer terms, mistakes are called bugs. This term comes from the time when computers were as big as entire rooms and real bugs were a problem:

> American engineers have been calling small flaws in machines “bugs” for over a century. Thomas Edison talked about bugs in electrical circuits in the 1870s. When the first computers were built during the early 1940s, people working on them found bugs in both the hardware of the machines and in the programs that ran them.
>
> In 1947, engineers working on the Mark II computer at Harvard University found a moth stuck in one of the components. They taped the insect in their logbook and labeled it “first actual case of bug being found.” The words “bug” and “debug” soon became a standard part of the language of computer programmers. (Smithsonian National Museum of American History, n.d.)

The process of fixing bugs is called debugging. If you follow the examples in this book exactly, debugging is not difficult; you simply compare what you typed to the example and find the difference. Once you get a little more adventurous and try to make a few small changes to the scripts, you will need some ideas to help you solve problems.

Testing for Bugs

There are two main types of bugs: (1) those that cause your script not to work, and (2) those that cause your script to work but not work properly. The first type is easy to detect because you will either get an error message or nothing will happen (see the following section). The second type is much harder to detect because everything will appear to work fine, but the results you get will not be right (e.g., the computer tells you how many questions were answered correctly, but the number it gives is not the right number). Both kinds of bugs require you to test your project to make sure it is working properly.

When you write a procedure, you should try to tie it to a button as soon as possible. Then go to Slide Show View and click on the button. If you get an error message or, more likely, nothing happens, you know you have a problem. This is probably the first type of error, and you can go back to your script to find out what is wrong.

If something happens, but it is the wrong thing, you know you have a problem. This is the second type of error. Unfortunately, the second type of error is usually harder to spot and requires much more extensive testing as well as paying close attention to what happens. For something as simple as the `DoingWell` procedure (from Chapter 6), it might be easy to see that you have a problem, but this procedure relies on the `YourName` procedure to give it the correct answer. If `DoingWell` brings up a `MsgBox` with “You are doing well, ” and no name, there is a problem, but where is it? Before you even track down where the problem is, you must notice that a problem exists. If you are not paying close attention, you will see a `MsgBox` pop up, but you will not notice that anything is wrong.

As our procedures become more and more complicated and more and more interdependent, spotting a problem can be very difficult. If a procedure isn’t tied to a button but called from another procedure, you can’t simply tie the procedure to a button and expect it to work. A procedure that depends on other things happening first is hard to test. If you tie `DoingWell` to a button and click on the button, you might not get the results you expect, but it might be because something is wrong, or it might be because you haven’t clicked on a button that is tied to `YourName` yet. This could be because some of your procedures are written incorrectly, you are testing out an isolated procedure before putting the whole presentation together, or you didn’t force the student to type a name before moving through the presentation.

This is an example of why thoroughly testing your procedures is very important. If you create a presentation, you know what you are supposed to do. If you always do what you are supposed to do and everything works, you know the project works when your students always do what they are supposed to do. Do your students always do what they are supposed to do? Of course not. They will get answers wrong. They will click on one button when you gave them directions to click on another button first. They will use arrow keys and the space bar to move to the next slide if you forgot to put your presentation in Kiosk mode. They will click the same button 50 times in a row, just to hear the sound that the wrong answer buttons make. In short, they will not do everything right, and when you are testing your program, you should not either.

No News Is Bad News

VBA is not very talkative when it comes to bugs. Once it encounters a bug in a procedure, it just stops. You could have a procedure that is 100 lines long, but if there is bug on the first line, the last 99 won’t execute. And VBA will be silent. If you’re like me, you click on the button again (and again and again and again), muttering to yourself that it has to work. On the one hand, it would be nice if VBA told you something was wrong, a polite `MsgBox` saying, “I’m sorry, but you have a problem in your procedure. I cannot continue.” On the other hand, computer error messages are notorious for being incomprehensible. So would you rather get nothing or “36549 invalid register access”?

Just treat nothing as your private error message. If you expect something and nothing happens, you know something is wrong, and it is time to start looking for bugs.

PEBKAC Errors

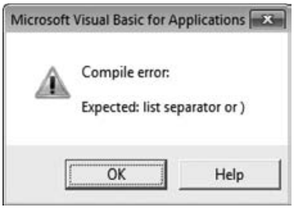
PowerPoint and VBA do have some bugs of their own, but most errors you are likely to encounter are of the PEBKAC variety. PEBKAC stands for “problem exists between keyboard and chair.” That is, you are the source of the problem. However, coding errors are easy to make because there are many details to pay attention to at once. But the most frustrating errors are the ones that are not problems with your code. The most common error is to fail to tie the button to a procedure or to fail to tie it to the correct procedure. When this is combined with VBA’s “no news is bad news” policy, you easily can be misled to believe that the problem is with your VBA. That is why, when something doesn’t work, the first thing to check is that the button is tied to the right procedure. For example, you might tie your first button to `YourName` instead of `GetStarted`. If you do, when you click the button, it will ask for a name and nothing more. It gets worse if you have put `ActivePresentation.SlideShowWindow.View.Next` into `YourName` so it asks for a name and goes to the next slide. In other words, it looks like it did everything right, but it didn’t do any of the behind-the-scenes work of `Initialize`. Then, later in the presentation, something doesn’t work or a shape is showing that should be hidden or the score is not correct. This bug is very hard to track down if you just look at the behavior of the presentation. That is why the first step to debugging is almost always verifying that your button is tied to the correct procedure.

The Error in Red

Sometimes the VBA Editor will catch an error and highlight it in red. As you type your code and hit the Enter key (Return key on a Macintosh) after you type a line, certain types of errors will turn red. You can also get those same errors to turn red by clicking on any other line in your module. Keep in mind that lines that end with an underscore are continued on the next line, so you have to hit Enter after the whole line is finished or you have to click on a different line to get the error to turn red.

One common mistake is to type a line and immediately switch back to PowerPoint to test out your procedure. If you do this without hitting Enter or clicking on another line, you will miss the red, and your procedure will not work. The line still will be red when you get back to the VBA Editor, but you will have wasted the time going back to PowerPoint, running your procedure, and scratching your head for a few seconds while trying to figure out what went wrong.

Usually, with errors that turn red, you will also get a message right away that tells you something about the error. For example, Figure 11.1 shows a typical error.



Microsoft Visual Basic for Applications

Compile error:

Expected: list separator or)

Figure 11.1. Typical Compile Error

This is a compile error. A compile error happens when the computer can't even figure out what to try to do. In this case, it is probably looking for a close parenthesis. It even suggests that that might be the case. A line like the following will generate the error in Figure 11.1:

```
username = InputBox("What is your name"
```

Sometimes these messages are helpful, and sometimes they are not. Although the message in Figure 11.1 indicates that we are missing a comma or a close parenthesis, sometimes a message like that is the result of some completely different problem.

Try typing the following procedure to add a 16-point star to your current slide:

```
Sub AddStar()
   ActivePresentation.SlideShowWindow.View.Slide.Shapes.AddShape _
        (msoShape16pointStar
End Sub
```

If you hit Enter (or click anywhere else in your module) after typing `msoShape16pointStar`, you will get the error in Figure 11.1, and the line with the error will turn red. In this case, we are missing the close parenthesis, so we can add it:

```
Sub AddStar()
   ActivePresentation.SlideShowWindow.View.Slide.Shapes.AddShape _
        (msoShape16pointStar)
End Sub
```

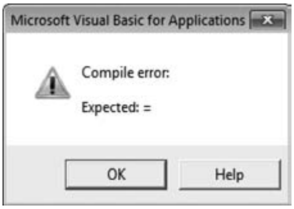
Now when you hit Enter, the line doesn't turn red. Does that mean that it works? No, it does not. But we're ready to try it out to see if it works.

Create a button and tie it to the procedure `AddStar`. Go to Slide Show View and click on your button. No news is bad news. The VBA Editor (or more accurately, the VBA compiler) couldn't find anything wrong as you typed, but when VBA tried to run the procedure, it couldn't figure it out, so it just gave up.

Unfortunately, we don’t have any more clues as to what is wrong. However, since we are adding a shape, we might remember that we need to tell VBA where the shape should go and how big it should be:

```
Sub AddStar()
   ActivePresentation.SlideShowWindow.View.Slide.Shapes.AddShape _
        (msoShape16pointStar, 100, 100, 100, 100)
End Sub
```

We have told VBA that we want our shape to be 100 pixels from the left of the screen, 100 pixels from the top of the screen, 100 pixels wide, and 100 pixels tall. This should fully define our shape. Hit Enter and now VBA starts to complain again with the error in Figure 11.2.



Compile error:

Expected: =

Figure 11.2. Typical Compile Error

Now, VBA thinks we are missing an equals sign. This is a good example of a cryptic message that can be a bit deceiving. In fact, we *are* missing an equals sign, but simply adding an equals sign (like we added a parenthesis earlier) won’t do the trick. The problem here (as is often the problem when VBA complains about a missing equals sign) is that we have created an object, and when VBA creates an object, it wants to put that object in a variable (whether or not we ever want to do anything with that object again). Thus, we need to set a variable to point to the new object (using `Set` because it is an object):

```
Sub AddStar()
   Set myShape = _
        ActivePresentation.SlideShowWindow.View.Slide.Shapes.AddShape _
        (msoShape16pointStar, 100, 100, 100, 100)
End Sub
```

Now, we are in good shape! If you hit Enter, nothing will turn red, but we won’t know if it works until we try it. Go back to PowerPoint, go to Slide Show View, and click on your button. If all goes well, you will now have a new shape on your slide. Note also that if you didn’t want a reference to the shape later, you could leave off the parentheses and leave off the `Set myShape = `.

Of course, if you click on the button a second time, nothing will happen. Or, it will appear that nothing happens. That is because you will create another shape on top of the first shape. If you go back into Normal View in PowerPoint, you can see that you have two shapes by dragging one of the shapes out of the way.

I’m Not Seeing Red, but I’m Seeing Red

The previous example was fairly simple. It was one line, so we knew where the problem was; it had to be in that line. Many of your procedures will be more complicated. If you have a procedure with 2 or 3 or 10 or 20 lines, you won’t know where the problem is. One small error in the middle of a procedure might cause your button to do nothing. You should be able to catch the errors that the VBA Editor turns red because they will be red, but the ones that don’t turn red are harder to find.

Now we need some way to figure out which line is the problem for those errors that don’t turn red. While VBA has some tools to help you with debugging, these tools are not always the best choice. That is because of the distinction between Slide Show View and Normal View. When you are in the VBA Editor, PowerPoint is generally sitting in Normal View. Remember that most of our procedures are made to work in Slide Show View (anything that starts with `ActivePresentation.SlideShowWindow` is only going to work in Slide Show View).

To solve this problem, you can use `MsgBox`. `MsgBox` is a simple (read that as “hard to mess up”) command that pops up a message. Add a few `MsgBox` commands to your code with informative messages that tell you what you are expecting and where you are in the code. For example, you might put a `MsgBox` at the beginning of the procedure:

```
MsgBox "Entering the procedure AddStar."
```

When you run the procedure, if you don’t even get a message that pops up to say, “Entering the procedure AddStar,” you know the problem probably is not in the procedure (unless it is in the `Dim` statements in the procedure because the first `MsgBox` has to come after the procedure’s `Dim` statements). It could be that you linked your button to the wrong procedure, or in a more complicated script, it could be that the problem is in another procedure that calls this one. If you get the message, you know you have gotten into the procedure. Now, you can add some more `MsgBox` commands to try to locate the problem. For example:

```
Sub AddStar()
   Dim myShape As Shape

   MsgBox "Entering the procedure AddStar."
   Set myShape = _
```

```
        ActivePresentation.SlideShowWindow.View.Slide.Shapes.AddShape _
        (msoShape16pointStar, 100, 100, 100, 100)
   MsgBox "I just added the shape, and I'm about to add some text."
   myShape.TextFrame.TextRange.Text = "Good job!"
   MsgBox "I just added some text, and I'm about to change the color."
   mShape.Fill.ForeColor.RGB = vbBlue
   MsgBox "Color is changed; now I'll change the size."
   myShape.Height = 200
   myShape.Width = 200
   MsgBox "I am about to leave AddStar."
End Sub
```

Try running the previous procedure. See if you can find the error. As you run the procedure, you should get the messages:

- Entering the procedure AddStar.
- I just added the shape, and I'm about to add some text.
- I just added some text, and I'm about to change the color.

But that will be it. You will know that the problem is probably in the following line. If you look closely, you will see that the line has a small typo; it uses `mShape` instead of `myShape`. Once the problem is fixed, try it out again. If it works, you can delete all the `MsgBox` lines.

You can also use a `MsgBox` to tell you what is in a variable. For example, if something is wrong with the scoring in a quiz, you might want to use the following line at various places to get updates about what the computer thinks the score is:

```
MsgBox "The value of numCorrect is " & numCorrect
```

This will work most of the time. Unfortunately, certain kinds of errors will not turn red and will not allow the procedure to run at all (for example, instead of misspelling `myShape`, try misspelling `RGB`). These are harder to find and are a good reason to use some tricks to prevent errors in the first place.

> One problem with using `MsgBox` in this way is that it interrupts you every single time the `MsgBox` comes up and forces you to click the OK button for it to keep going. An alternative is to use `Debug.Print` instead of `MsgBox`. For example,
>
> ```
> Debug.Print "The value of numCorrect is " & numCorrect
> ```
>
> You can use `Debug.Print` in any place you would use a `MsgBox` for debugging. Instead of popping up a `MsgBox` on the screen and requiring

you to dismiss it by clicking OK, `Debug.Print` writes the message to the *Immediate Window* in the VBA Editor. After running through your project, you can look in the Immediate Window and see all the messages that came up. If you don't see the Immediate Window, go to the VBA Editor and choose **Immediate Window** in the **View menu**.

Commenting Out

Because the `MsgBox` method, in the previous section, works sometimes and doesn't work other times, you might need another *old programmer's trick* to find your error: commenting out. Remember that everything on a VBA line after a single quote is ignored; that is, it is a comment. You can put a single quote at the beginning of a line and that entire line will be ignored. This is better than deleting the line because you still have the code there, and you can get it to run again by deleting the single quote. Note that the VBA Editor turns comments green, so if you have anything that is green in your code, it is ignored by VBA. Thus, if you put a single quote at the beginning of a line, the entire line will turn green and be ignored by VBA.

```
Sub AddStar()
   Dim myShape As Shape

   MsgBox "Entering the procedure AddStar."
   Set myShape = _
        ActivePresentation.SlideShowWindow.View.Slide.Shapes.AddShape _
        (mso16pointStar, 100, 100, 100, 100)
   MsgBox "I just added the shape, and I'm about to add some text."
   myShape.TextFrame.TextRange.Text = "Good job!"
   MsgBox "I just added some text, and I'm about to change the color."
   myShape.Fill.ForeColor.RGB = vbBlue
   MsgBox "Color is changed; now I'll change the size."
   myShape.Height = 200
   myShape.Width = 200
   MsgBox "I am about to leave AddStar."
End Sub
```

This procedure is similar to the one earlier, except there is a different error. If you try running the procedure with this error, nothing will happen. You won't even get "Entering the procedure AddStar." That means that it is time to comment out some lines to try to track down the problem. Since nothing can work until the shape is created, you probably want to start with the line after `Set myShape . . . .`

```
Sub AddStar()
   Dim myShape As Shape

   MsgBox "Entering the procedure AddStar"
   Set myShape = _
        ActivePresentation.SlideShowWindow.View.Slide.Shapes.AddShape _
        (mso16pointStar, 100, 100, 100, 100)
   'MsgBox "I just added the shape, and I'm about to add some text."
   'myShape.TextFrame.TextRange.Text = "Good job!"
   'MsgBox "I just added some text, and I'm about to change the color."
   'myShape.Fill.ForeColor.RGB = vbBlue
   'MsgBox "Color is changed; now I'll change the size."
   'myShape.Height = 200
   'myShape.Width = 200
   'MsgBox "I am about to leave AddStar."
End Sub
```

You'll notice that all the lines after the `Set myShape` (except `End Sub`) line are green in the VBA Editor. These lines will not run. As far as VBA is concerned, they are not even there.

Try running the procedure with all the comments. If it works, start removing the comments (just the single quotes, not the whole lines) from the line below `Set myShape`. Run it again. If it works, remove the comment from the next line and run it again. Keep removing one comment and running it again until it stops working. When it stops working, you have found the problem line. It must be the last line from which you removed the comment. If you haven't removed any of the comments and it still doesn't work, then the problem is probably the `Dim` statement or the `Set myShape` line.

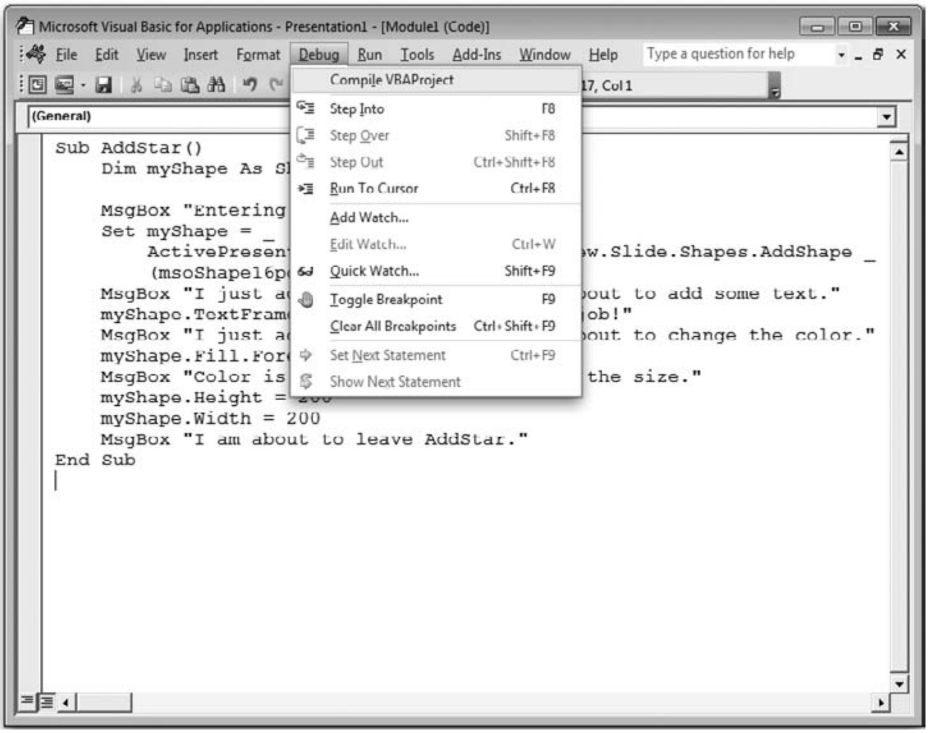
If you go through this exercise, you'll find that the problem is with the `Set myShape` line. `mso16pointStar` should be `msoShape16pointStar`. Often the parameters of procedures are the kinds of errors that will cause a procedure to not work at all, rather than work until it reaches an error. But the best way to eliminate errors is to practice some prevention techniques. They won't prevent all errors, but they will cut down on errors.

Compiling Your Code

Sometimes your code will not work, and you won't know why. You might have tried all the techniques in this chapter so far, but you still can't find the bug. There is one more technique that sometimes gives more information: compiling your code.

Certain kinds of errors are *run-time errors*. These happen when your code is running. The computer doesn't know that there is a bug until it tries to run the code. Other kinds of errors are *compile errors*. These are errors in which the computer can see a problem before you run the code. Errors that turn red are one type of compile error, generally errors that affect one specific line of code. Other errors do not turn red, but they make all the code stop working.

You can find compile errors by choosing **Compile VBAProject** from the **Debug menu** in the VBA Editor (see Figure 11.3). This will look over your code for any errors that the computer can catch before your code is run.



```
Sub AddStar()
    Dim myShape As Sl

    MsgBox "Entering
    Set myShape = _
        ActivePresen                      w.Slide.Shapes.AddShape _
         (msoShape16p
    MsgBox "I just a                      bout to add some text."
    myShape.TextFram                      ob!"
    MsgBox "I just a                      bout to change the color."
    myShape.Fill.For
    MsgBox "Color is                      the size."
    myShape.Height = 200
    myShape.Width = 200
    MsgBox "I am about to leave AddStar."
End Sub
```

Figure 11.3. Compile VBA Project

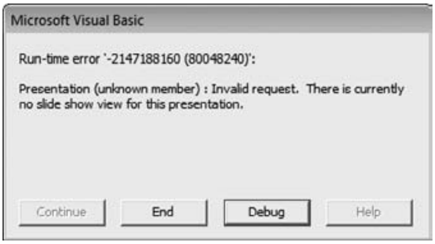
If you get a message that includes “Compile error,” you will probably get some useful information about what is wrong. It will probably highlight where the problem is in your code and describe the problem. For example, the error “Argument not optional” tells you that you are missing an argument for a procedure or method. And you will know which procedure or method is missing the argument because it will be highlighted. If you have more than one compile error, then you will have to do this again because the compiler stops on the first error it finds. Fix the first error and compile your project again to see if there are any more errors.

If you go to the **Debug menu**, and **Compile VBAProject** is grayed out so you can’t select it, change something in your code and hit the Enter or Return key. Once the VBA Editor recognizes that something has changed, it will let you compile to check for errors.

Debugger

The VBA Editor comes with a debugger. In some cases, this will be useful, but it will not work well for most of our code. The debugger lets you set breakpoints to stop your code at certain points as it runs. Unfortunately, this does not work well for code that runs in Slide Show View, so it is not useful for many of our purposes.

When running your code, you might get a run-time error. These are errors that the computer can't catch in advance and only knows about when you try to run the code. The error messages for run-time errors are almost always cryptic, so you are unlikely to understand what they mean. Figure 11.4 shows an example of a run-time error that you can get when trying to run code in Normal View when it is meant to be run in Slide Show View.



Run-time error '-2147188160 (80048240)':

Presentation (unknown member) : Invalid request. There is currently no slide show view for this presentation.

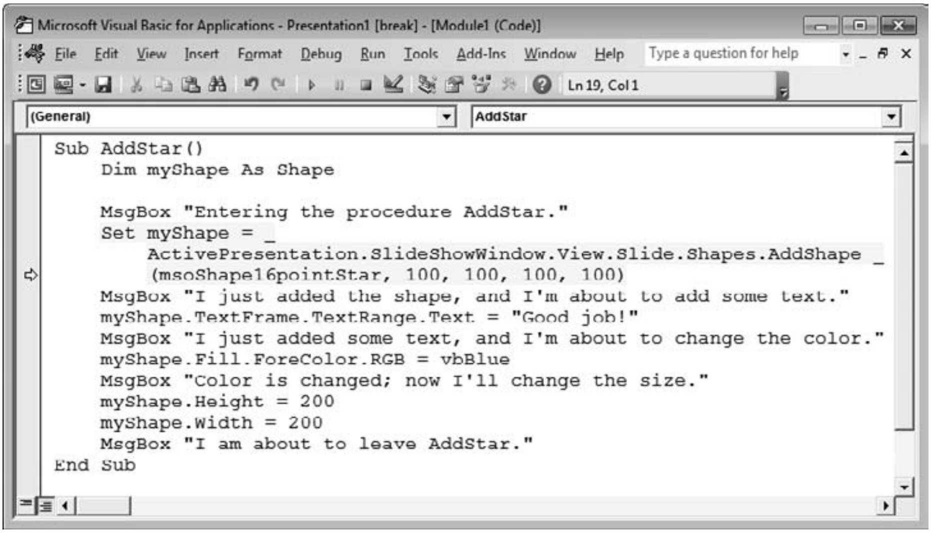
Figure 11.4. Run-Time Error

Note that the dialogue box in Figure 11.4 has two buttons that you can press. If you press **End**, it will just stop. If you press **Debug**, it will take you the VBA Editor and highlight the line that caused problems. Sometimes this is really the problem line, and sometimes it isn't. However, it will also enter VBA into break mode. This is a feature of the debugger that is sometimes helpful but will probably just get in your way. You'll know you're in break mode when one of the lines of code is highlighted yellow, and there is a yellow arrow to the left of the code pointing to where the code has stopped (see Figure 11.5).

If you are in break mode, VBA has stopped, so even if you click on working buttons, they will not work. If you find yourself in break mode and want to get out, go to the **Run menu** and choose **Reset** in the VBA Editor.

An Ounce of Prevention

As you write your code, you can use several techniques to help you catch bugs as you type. These techniques will not prevent all bugs, but they will cut down on the number you have to find later. If you are perfect and never make mistakes, these techniques won't affect anything. The techniques are for human eyes; the computer will be able to run your code without them. But for those



Microsoft Visual Basic for Applications - Presentation1 [break] - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
Ln 19, Col 1
(General)
AddStar

```
Sub AddStar()
    Dim myShape As Shape

    MsgBox "Entering the procedure AddStar."
    Set myShape = _
        ActivePresentation.SlideShowWindow.View.Slide.Shapes.AddShape _
        (msoShape16pointStar, 100, 100, 100, 100)
    MsgBox "I just added the shape, and I'm about to add some text."
    myShape.TextFrame.TextRange.Text = "Good job!"
    MsgBox "I just added some text, and I'm about to change the color."
    myShape.Fill.ForeColor.RGB = vbBlue
    MsgBox "Color is changed; now I'll change the size."
    myShape.Height = 200
    myShape.Width = 200
    MsgBox "I am about to leave AddStar."
End Sub
```

Figure 11.5. Break Mode

of us who are not perfect, our human eyes need all the help we can get to catch bugs or prevent them from happening.

Capitalization

You might have looked at some of the examples and wondered why certain things were capitalized in certain ways. Some of it is part of a technique to prevent bugs, and some of it is forced upon you by VBA. There are five kinds of things you can type into the VBA Editor:

1. Comments
2. Text between quotes
3. Variable names
4. Procedure names
5. VBA stuff (built-in function names, procedure names, object names, etc.)

Comments can be capitalized any way that you like because they are for you to read. Pay close attention to capitalization of text between quotes because that will usually be displayed for your students, but for the purposes of debugging, it doesn't matter how you capitalize it. Capitalization of the last three items can be important for debugging.

In this book, I have used the following convention: Variable names begin with a lowercase letter; and procedure names begin with an uppercase letter. Furthermore, since variable names and procedure names cannot contain spaces, any new word in the name begins with an uppercase letter. This is a convention, a technique, a trick. I could have used `yourName` instead of `YourName` and `UserName` instead of `userName`. It would have worked fine. However, if you use this convention, you can look at your code and always tell whether a name refers to a variable or a procedure by looking at the capitalization. Capitalizing the first letter of each subsequent word in a variable or procedure name simply helps you read it more easily. You want to be able to read the names because you picked names that make sense to you.

You should be able to tell immediately that the following are variables, and you probably even have a reasonable idea of what information they hold: `myShape`, `numCorrect`, `userName`, `printableSlide`. You should be able to tell immediately that the following are procedures: `YourName`, `RightAnswer`, `AddStar`.

For the VBA stuff, you don't have a choice about capitalization. Most VBA stuff will be capitalized for you, no matter how you type it. This is a good thing that can help prevent bugs.

Don't Capitalize to Prevent Bugs

While you are writing your scripts, the VBA Editor tries to be helpful. You might find this annoying at times, but many of its helpful features can prevent future problems.

The VBA Editor will automatically adjust your capitalization for you. This might seem excessively meticulous, but you can use it to catch typing mistakes. You'll notice that built-in procedures and commands (such as `MsgBox` and `Dim`) all start with capital letters. The only times you should capitalize words yourself are in `Dim` statements (declaring variables), `Sub` or `Function` statements (at the beginning of procedures), and inside quotes. When you capitalize in `Dim` statements and `Sub` statements, you are defining the variable or procedure for the first time so this is what tells the computer how you want the name capitalized. After that, don't capitalize.

If you follow the capitalization convention, after you have declared a variable with a `Dim` statement, always type it in lowercase. And after you write a procedure and capitalize it properly in the `Sub` statement, if you call the procedure from another procedure, you can type its name in lowercase. Not only is it easier to type in lowercase, it will help you catch mistakes.

After you type a line and hit Enter (or click somewhere else in your script), the VBA Editor will automatically adjust the capitalization. For example, type the following:

```
activepresentation.slideshowwindow.view.next
```

When you hit Enter, the VBA Editor will change it to:

```
ActivePresentation.SlideShowWindow.View.Next
```

The power of this is apparent when you type something wrong. If you left out a "t" in `ActivePresentation`, for example, that would not be capitalized. Type the following:

```
activepresenation.slideshowwindow.view.next
```

When you hit Enter, it changes to:

```
activepresenation.SlideShowWindow.View.Next
```

The fact that `activepresenation` did not change in capitalization is a tip-off that something is wrong.

This also works for any variables that you have declared and procedures you have written. The VBA Editor gets the capitalization that you want to use from the `Dim` statement and the `Sub` statement (that's why you have to type with proper capitalization in the `Dim` and `Sub` statements) and automatically adjusts the capitalization as you type the variable or procedure name in the future. If the capitalization is not automatically adjusted for you, you have either misspelled the name of the variable or procedure or have forgotten to declare the variable.

Misspelling the name of a variable or procedure gives the same results as misspelling a keyword: The capitalization will not be changed by the VBA Editor. For example, type the following:

```
Dim userName As String

Sub YourName()
   usernam = InputBox(prompt:="Type your name")
End Sub
```

Because `userName` is misspelled as `usernam`, the `n` did not get capitalized, tipping you off to a problem.

Naming Conventions

Beyond capitalization, many programmers like to use a variety of naming conventions to name their procedures and their variables. Just like capitalizing the first letter of a procedure and not the first letter of a variable helps you tell the two apart, a naming convention can help you know even more about a procedure or variable just by looking at the name. For most things in this book, it won't make too much of a difference for you, but if you have made it this far, you might be halfway to being a programmer. One of the most common naming conventions is to start each variable name with a letter representing the type of variable it is. For example, we might start with `i` for `Integer` so instead of `numCorrect`, we might have `iNumCorrect`. Another type of variable we have used is `String` so instead of `userName`, we might have `sUserName`.

Also, there are a wide range of objects (many of them start with the same letter, such as `Shape` and `Slide`) so many of my programmer friends start all object variables with `o`, such as `oShp` and `oSld`. This is particularly useful because objects are very special variables that are often used very differently from regular variables.

Whatever naming conventions you choose, it is important to be consistent with them. As a beginner, you can play around with different conventions to see what works for you, but as you get more advanced, you will find that naming conventions get you out of many jams.

`Option Explicit`

Another great trick to catch and prevent errors is `Option Explicit`. Put that on a line by itself at the top of your module (even before the `Dim` statements). In all the code in this book, we have declared all our variables with the `Dim` statement. If you don't declare a variable, your code will work, maybe, kind of, sort of. But there are lots of problems that you will run into when you don't declare a variable. For example, if you don't declare `userName` at the top of your module, the `YourName` procedure will store something in `userName` and immediately forget it. By the time you get to the `RightAnswer` procedure, there will no longer be a `userName` variable so it will re-create an empty one. Because of that, we always, always, always declare all our variables. By putting `Option Explicit` at the top of the module, any variable that wasn't declared will result in a compile error: "Variable not defined."

This helps in two ways. First, it helps when you are lazy or forgetful and don't declare a variable that you should declare (such as `userName`) and will have problems when you run your procedure. Second, it helps catch typos. If you misspell a variable (e.g., `userNam` instead of `userName`), the compiler will warn you that `userNam` is undeclared.

Indenting

You might have noticed that throughout the text, code examples were indented in a very specific way. Indenting helps you read the code. The computer will understand your code just fine without indenting, but you are more likely to make mistakes without it. "Conditionals" in Chapter 9 discussed indenting briefly because indenting is very helpful for reading `If` statements. It is also helpful for reading loops. The more complex the code, the more helpful indenting is.

You can use your own style for indenting, but whatever you decide, you should stick with it. The easiest way to indent in the VBA Editor is to use the Tab key. When you hit Tab at the beginning of a line, the line will be indented once. When you hit Enter to go to the next line, the next line will be indented at the same level. If you don't want it indented, simply hit the Backspace key

(Delete on a Macintosh) or hold down the Shift key and hit Tab (shift-Tab). If you have a block of lines that you want to indent, you can highlight them and hit Tab (or shift-Tab if you want to un-indent them).

In this book, I have indented three kinds of statements:

1. Everything between a `Sub` and an `End Sub` is indented one level.
2. Everything that is part of a block is indented. This includes parts of an `If` block (such as everything between `If` and `ElseIf` or everything between `ElseIf` and the next `ElseIf` or everything between `Else` and `End If`). This also includes loops (such as everything between `For` and `Next` or everything between `While` and `Wend`).
3. Lines that are continued from the previous line (where the previous line ends with an underscore) are indented.

Indenting helps you see that something is a part of something else: A group of lines is part of the `Sub`, a group of lines is part of the `ElseIf` portion of an `If` block, a continued line is a part of the previous line, etc. Look at the following example:

```
Sub NestedIf()
If gradeNum > 90 Then
MsgBox "Great job. You got an A."
If gradeNum = 100 Then
MsgBox "You are perfect."
End If
ElseIf gradeNum > 80 Then
MsgBox "Good work. B is a very good grade."
ElseIf gradeNum > 70 Then
MsgBox "Not bad. C is still passing."
If gradeNum < 72 Then
MsgBox "That was close. You were lucky to get a C."
End If
Else
MsgBox "You can do better than this."
End If
If gradNum > 70 Then
MsgBox "You have passed this class."
End If
End Sub
```

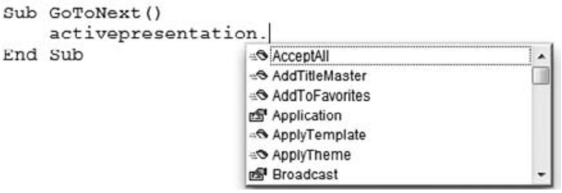
You might be able to understand this code, but without indenting, it is hard to tell which `End If` goes with which `If` and under what circumstances each line will get executed. This is much easier to understand when everything is indented:

```
Sub NestedIf()
   If gradeNum > 90 Then
        MsgBox "Great job. You got an A."
        If gradeNum = 100 Then
               MsgBox "You are perfect."
        End If
   ElseIf gradeNum > 80 Then
        MsgBox "Good work. B is a very good grade."
   ElseIf gradeNum > 70 Then
        MsgBox "Not bad. C is still passing."
        If gradeNum < 72 Then
               MsgBox "That was close. You were lucky to get a C."
        End If
   Else
        MsgBox "You can do better than this."
   End If
   If gradNum > 70 Then
        MsgBox "You have passed this class."
   End If
End Sub
```

Each part that is indented is now clearly part of the line before it. It is easiest to indent and un-indent as you go because as you type your code, you know what you mean.

Hints from the VBA Editor

The VBA Editor often tries to give you helpful suggestions. This feature is called IntelliSense. You might have noticed that when you type a dot, sometimes a box pops up with possibilities for what to type next. See Figure 11.6 for an example.



```
Sub GoToNext()
    activepresentation.
End Sub
```

Figure 11.6. Auto-Complete Suggestions from the VBA Editor

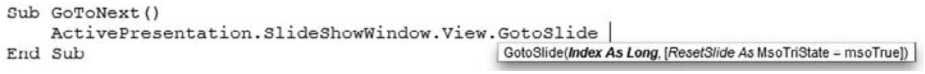
In this case the scrollable window gives you a list of all the things you can type after `ActivePresentation.` You can choose from the list by double-clicking on any item, or you can start typing. As you type, the window highlights the first thing in the list (in alphabetical order) that matches what you type. If nothing is highlighted, you have probably typed something wrong.

Generally, that list is all that is available to type. If the list of choices has gone away, you can delete the line back to the dot; when you type the dot again, the list will come back.

In addition, the VBA Editor will make some suggestions for parameters for procedures. For example, if you type

```
activepresentation.slideshowwindow.view.gotoslide
```

followed by a space, the VBA editor will give you some hints about what you can type next, specifically what parameters the `GotoSlide` method wants (see Figure 11.7).



```
Sub GoToNext()
    ActivePresentation.SlideShowWindow.View.GotoSlide
End Sub
```

GotoSlide(***Index As Long***, [*ResetSlide As* MsoTriState = msoTrue])

Figure 11.7. VBA Editor Suggests Parameters for the `GotoSlide` Method

The little box has a lot of details that will help you. First, you can see that there are two possible parameters separated by commas: `Index` and `ResetSlide`. Although the box does not tell you what the parameters are for, it does tell you what kind of information they need. In this case, `Index` is a `Long` variable (that's a kind of integer). You can probably figure out that it is the slide number of the slide to go to. `ResetSlide` is an `MsoTriState` variable (which is usually just a `True` or `False` value).

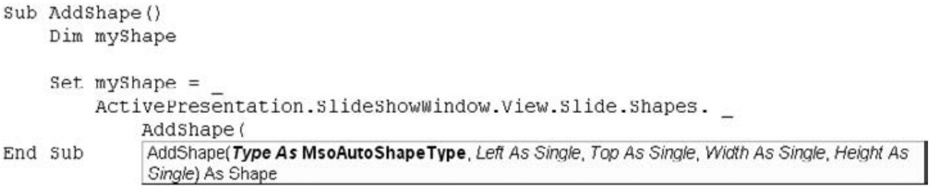
You should also notice that `Index` is not in square brackets, but `ResetSlide` is. This tells us that `Index` is required and `ResetSlide` is not. That is, you have to tell `GotoSlide` which slide to go to, but you don't have to tell it whether or not to reset (the `ResetSlide` tells it whether or not to reset the animation effects on the slide; i.e., leave them in their final state or put them back at the beginning state). Also, notice that `ResetSlide` has a default value. That is, if you don't include a value for `ResetSlide`, it will assume you wanted `msoTrue` (which is basically the same as `True`), which means that the slide will be reset. Finally, you will notice that `Index` is in bold. That means that the next thing I type will be the value used for `Index`. If I type a number and then a comma, `ResetSlide` will become bold, meaning that the next value I type will be the value for `ResetSlide`. If you type parameters in order, you can just type the values as in the following:

```
ActivePresentation.SlideShowWindow.View.GotoSlide 5, True
```

If you don't type them in order, you can use the parameter name, followed by colon equals sign (`:=`), followed by the value, as in the following:

```
ActivePresentation.SlideShowWindow.View.GotoSlide ResetSlide:=True, _
   Index:=5
```

This is very helpful for a couple of reasons. First, you don't always have to look up which parameters are needed. For example, when adding a shape, I can never remember which comes first and second: `Top` and `Left` or `Width` and `Height`. I don't need to remember because VBA will tell me, as in Figure 11.8.



```
Sub AddShape()
    Dim myShape

    Set myShape = _
        ActivePresentation.SlideShowWindow.View.Slide.Shapes. _
            AddShape(
End Sub     AddShape(Type As MsoAutoShapeType, Left As Single, Top As Single, Width As Single, Height As
            Single) As Shape
```

Figure 11.8. VBA Editor Suggests Parameters for the `AddShape` Method

Second, you always know what the procedure expects. If you leave off any required parameters (such as forgetting to specify `Width` and `Height`), it won't work.

VBA Help

Microsoft is notorious for having help that is only moderately helpful at best. However, the VBA Editor does include help. The key is to make sure you are accessing VBA help and not general PowerPoint help. In Windows, the easiest way to access help is to type a keyword into the Help box (where it says "Type a question for help") on the **Menu toolbar**. On a Macintosh, the standard toolbar has a question mark in a circle, and clicking that gives you a link to VBA help (the **Help menu** has general PowerPoint help, not VBA help). From there, click on the link to the **Visual Basic Editor Help** online because searching for a keyword in the search box will only give you general PowerPoint help. Once you get to the right help, you can usually find information about most commands, objects, properties, and methods and occasional examples.

You might do better to look for help online. Steve Rindsberg's PPT FAQ (http://www.pptfaq.com/) has a very helpful "Programming PowerPoint" section. Shyam Pillai (http://skp.mvps.org/) and John Wilson (http://www.pptalchemy.co.uk/) have extensive VBA sections with many interesting examples (John got started with VBA from the first edition of this book and has since gone way beyond anything this book has to offer to become a true VBA expert).

Finally, you might ask your question in the Microsoft Answers Forum (http://answers.microsoft.com/en-us/office/forum/powerpoint) for PowerPoint. Most of the questions there have nothing to do with VBA, but several VBA experts (including Steve, Shyam, and John) answer questions there, so if you can't find the answer on your own, that is a good place to ask.

Common Bugs

Everyone makes mistakes, and everyone makes their own mistakes. However, a few mistakes are fairly common. If you can't track down a bug, you might look for some of these things. The bugs listed next are particularly tricky to find because they are not a problem with a specific procedure. If one procedure is not working at all or is giving the wrong results, you can usually find the bug if you stare at that procedure long enough (or use some of the prior techniques to track it down). However, the following bugs cause problems for procedures that are completely correct and might have been working a minute earlier. No matter how long you stare at a procedure, you won't find the bug if it is caused by something outside the procedure.

Multiple Modules

You were warned early in this book that you should have only one module for each presentation. If you have gotten this far in the book, you have probably heeded that warning. However, some people get confused and add a second module. Some things will work with more than one module, and some things won't. Check the Project window to be sure that you have only one module. If you can't remember how to check the modules in your Project window, look back at Chapter 5 in "Help! I've Lost My Windows."

Usually, when you add one module, it will be named "Module1." However, if you played around with modules or accidentally deleted a module, your module might be "Module2" or "Module3." That is OK as long as there is only one module, whatever it is named. If you have put code in more than one module, use cut and paste to move all the code into one module. If you had `Dim` statements at the top of each module, be sure you put them all together at the top of your one module and remove any duplicates.

Of course there are exceptions to the multiple module rule. We used a second module earlier in the book to put some utility procedures because they didn't interact in any way with the other procedures. Also, if you use userforms and control objects, you will have to use additional modules. The important point is to make sure that things in different modules don't interfere with each other, including variables and procedures with the same names (see the next sections).

Duplicate Variables

When we declare our variables at the beginning of a module, we create a box to put information in, and we give that box a name. What if two boxes have the same name? That would be a problem, and VBA would not know what to do. In fact, nothing in your module would work at all. You could have buttons tied to procedures that have nothing to do with the variable that is declared twice, but they would not work. Nothing would work.

You might have this problem if you are combining two examples or have a long list of variables that you declare at the beginning of your module, and you forgot you already declared a variable. If none of your VBA works, check the variable declarations at the beginning of the module and delete any duplicate `Dim` statements.

If you are combining code from two different places, it is helpful to name variables with something extra, such as the author's initials. This is particularly helpful in group projects. For example, you might be combining two people's work that both contain quizzes. Each quiz might use a `numCorrect` variable. It might work to have both quizzes share the same variable, but it might not. If it doesn't, one person could name all variables ending with his own initials (e.g., `numCorrectDM` and `numIncorrectDM`) and the other person could name all variables ending with her own initials (e.g., `numCorrectEM` and `numIncorrectEM`).

Duplicate Procedures

Just like VBA doesn't know what to do when you have two variables with the same name, it doesn't know what to do when you have two procedures with the same name. You might have been playing around with the examples in this book and accidentally wrote two `YourName` procedures. They might be exactly the same or different, but if they have the same name, nothing will work. Figure out which procedure does what you want and delete the duplicate. Or, if the two procedures are really supposed to be doing different things, give one of them a different name. You might also want to add a comment to explain what each procedure does.

Note that variables and procedures are not allowed to have the same name. If you give a procedure the same name as a variable, it will not work.

Extra `End Sub`

The VBA Editor is nice. It never requires you to type `End Sub`. When you hit the Enter key after typing a `Sub` line, the editor automatically types the `End Sub`. Most of the time, this is a good thing. Occasionally, it is not, such as when it leads to your code having too many `End Sub` lines. Since you don't type the `End Sub` lines, it is easy for extra ones to be added to your code.

If your code stops working, check for extra `End Sub` lines. They might be at the end of the module or at the end of a procedure. Usually they're in a place that is not showing on your screen, so you'll have to scroll to see them. Delete the extra `End Sub`, and your code might work again.

The Forgotten `Dim`

In some cases you don't need to declare variables, but if you want a variable to remember something later, you must declare it at the beginning of the module. It is easy to forget to do this. If, for example, you forget to declare `userName`, then `YourName` will work perfectly fine, asking for a name and storing it in `userName`, but once `YourName` is finished, `userName` is forgotten.

If you have forgotten to declare a variable, like `userName`, you might have a perfectly good `YourName` procedure and a perfectly good `RightAnswer` procedure, but when `RightAnswer` is run, it says "Good job," not "Good job, Ada." If your presentation seems to be forgetful, check your `Dim` statements to be sure that you have declared all your variables at the beginning of the module.

Exclamation Points in File Names

There are many oddities in PowerPoint. One of those oddities is that PowerPoint file names can't have an exclamation point in them if they use VBA. For some reason, the VBA won't work in a file with an exclamation point in the name. I try to avoid using strange characters (%, #, &, *, @, !, etc.) in file names. Some of them will work fine and some won't. The exclamation point is an example of a character that works for most things but does not work for PowerPoint with VBA.

Debugging Steps

As you get better at VBA, you will get used to the kinds of mistakes you make most often and how to find them. Here are some steps that I follow when I have trouble finding a bug:

1. Check to make sure the button is tied to the correct procedure. My students often are frustrated when their first button asks for a name and stops. They scour the code and find no errors … until they discover that the button is tied to `YourName` instead of `GetStarted`.
2. Compile the code. It won't catch everything, but it catches many common errors.
3. Sprinkle the code with `MsgBox` statements to find out which lines work.
4. Add variables and values to the `MsgBox` statements to follow the value of variables (e.g., `MsgBox "numCorrect is " & numCorrect`)
5. Comment out lines that might not be working.
6. Fix one bug at a time. When you find an error, fix it and see if it solves your problems. If you try to fix everything at once, you are more likely to get lost and make a mistake fixing the first problem.

While there are many more sophisticated debugging techniques and tools, these are the primary ones that I use, and I usually follow them in that order.

Error Trapping

What happens when something doesn't work? Actually, lots of things can happen. For compile errors, nothing will work; your VBA will just stop and maybe even never get started. For run-time errors, your VBA might stop in the middle and silently not do what you intended, or it might put up a cryptic error message. You have to fix the compile errors, and the tricks you have learned so far will do a pretty good job of helping you do that. You also have to fix most run-time errors because they are things that you need to get right. However, what happens if someone takes your perfectly good PowerPoint file, puts it on a CD (or other read-only disk), and then tries to write the results to a file (see Chapter 10)? VBA will just stop executing and not finish other things. You can't force VBA to write to a read-only file, but you can trap the error to finish doing the other stuff it is supposed to do and, perhaps, warn the user that writing to the file didn't work.

The three things you need for error trapping are the `On Error` statement, line labels, and the `Exit Sub` statement. The `On Error` statement tells a procedure what to do if it encounters an error. This can be in the form of going to a specific place in the procedure or continuing right after the line that caused the error. To go to a specific place in a procedure, you need a line label, which labels that place in the procedure. Your code might look like this:

```
Sub WriteWithError()
   On Error GoTo ErrorHandler
   Open ActivePresentation.Path & "\" & "myTestFile.txt" _
      For Output As #1
   Write #1, "We are writing to the file."
   Exit Sub
ErrorHandler:
   MsgBox "Sorry, I couldn't open the file."
End Sub
```

Notice the third-to-last line, which is `ErrorHandler:` and nothing else. This is a line label. It is a named spot in the code that a `GoTo` statement can use to go to that named spot. Thus, the line `On Error GoTo ErrorHandler` tells VBA if you happen to encounter a run-time error, just jump to the spot named `ErrorHandler`. In this case, the likely error is that you can't open the file `myTestFile.txt` for writing. If the file can't be opened, it jumps to the end and puts up a `MsgBox` with "Sorry, I couldn't open the file." This is a little better than dead silence leaving the user to wonder what happened to the file.

This is great when things don't work, but what happens when everything works as it should? If the file opens and is written without error, we don't want the MsgBox to come up. That is why we need the Exit Sub line. This line exits out of the procedure even if it is in the middle. In this case, it stops before it can bring up the MsgBox.

Let's see this in a real example. In Chapter 10, we added to the PrintablePage procedure to write the results to a text file as well as writing the results to a slide (see pp. 202–203). Let's add two lines to that code (marked by comments):

```
Sub PrintablePage()
   Dim printableSlide As Slide
   Dim homeButton As Shape
   Dim printButton As Shape

   Set printableSlide = _
        ActivePresentation.Slides.Add(Index:=printableSlideNum, _
        Layout:=ppLayoutText)
   printableSlide.Shapes(1).TextFrame.TextRange.Text = _
        "Results for " & userName
   printableSlide.Shapes(2).TextFrame.TextRange.Text = _
        "Your Answers" & Chr$(13) & _
        "Question 1: " & answer1 & Chr$(13) & _
        "Question 2: " & answer2 & Chr$(13) & _
        "Question 3: " & answer3 & Chr$(13) & _
   "You got " & numCorrect & " out of " & _
   numCorrect + numIncorrect & "." & Chr$(13) & _
   "Press the Print Results button to print your answers."

   On Error GoTo AfterWriting 'ADDED error trapping
   Open ActivePresentation.Path & "\" & "myTestFile.txt" For Output As #1
   Write #1, "Results for " & userName
   Write #1, "Your Answers"
   Write #1, "Question 1: " & answer1
   Write #1, "Question 2: " & answer2
   Write #1, "Question 3: " & answer3
   Write #1, _
        "You got " & numCorrect & " out of " & _
        numCorrect + numIncorrect & "."
   Close #1

AfterWriting: 'ADDED line label
   Set homeButton = _
        ActivePresentation.Slides(printableSlideNum).Shapes.AddShape _
        (msoShapeActionButtonCustom, 0, 0, 150, 50)
   homeButton.TextFrame.TextRange.Text = "Start Again"
   homeButton.ActionSettings(ppMouseClick).Action = ppActionRunMacro
   homeButton.ActionSettings(ppMouseClick).Run = "StartAgain"
   Set printButton = _
        ActivePresentation.Slides(printableSlideNum).Shapes.AddShape _
        (msoShapeActionButtonCustom, 200, 0, 150, 50)
   printButton.TextFrame.TextRange.Text = "Print Results"
   printButton.ActionSettings(ppMouseClick).Action = ppActionRunMacro
   printButton.ActionSettings(ppMouseClick).Run = "PrintResults"
   ActivePresentation.SlideShowWindow.View.Next
   ActivePresentation.Saved = True
End Sub
```

The line label is `AfterWriting`. The `On Error` statement is right before trying to write to the file. If we can't write to the file, the VBA will just skip over the writing to a file part and continue with the rest of the procedure. In this case, because we want to continue with the rest of the procedure whether there was an error or not, we don't use the `Exit Sub` statement.

This example does not bring up a `MsgBox` to say that there was an error. To do that, we would need to add an error handling section to the bottom of the procedure:

```
   Exit Sub
ErrorHandler:
   MsgBox "Sorry, I couldn't write to the file"
   GoTo AfterWriting
```

We would also change the `On Error GoTo AfterWriting` to `On Error GoTo ErrorHandler`. In this case, if there is an error, it will jump to the end to put up the `MsgBox` and then jump back to the spot after the (failed) file-writing code is finished.

You can use the `Err` function to return a number with specific information about the error. For example, error 53 is "File not found," and 75 is "Path/file access error" (the error you get if you write to a read-only file). If you are looking for a few common errors, you might do something like:

```
   Exit Sub
ErrorHandler:
   If Err = 53 Then
        MsgBox "Sorry, I couldn't find the file"
   ElseIf Err = 75 Then
        MsgBox "Sorry, I couldn't write to the file"
   Else
        MsgBox "Sorry, you had an error"
   End If
   GoTo AfterWriting
```

You can get a complete list of the error codes and more information about error trapping at http://support.microsoft.com/kb/146864.

You can write very sophisticated error handlers to deal with a wide range of contingencies, but the basics in this section should be enough to cover most of your needs.

Bugs That Aren’t Your Fault

Just like your code is not always perfect, the code that makes up PowerPoint is not always perfect. Every version has some bugs. Some are intermittent (they only affect some people some of the time) and some happen all the time. Some never get fixed and some get fixed in an update or service pack (and, occasionally, some new ones get introduced with an update or service pack). It is usually a good idea to keep PowerPoint (as well as your operating system) up-to-date with the latest updates and service packs. If you can’t figure out why something doesn’t work, you might try updating Office. If it still doesn’t work, you might ask about it online (such as the Microsoft Answers Forums) because others might be able to tell you how to fix it or that it is a bug in PowerPoint.

Final Word on Debugging and Error Prevention

The final word on debugging and error prevention is to test what you have done. If you can, test each procedure and/or button right away, so you can fix any problems before you have too much code with too many problems to deal with. But most importantly, test. You can’t fix a bug that you don’t find. And believe me, your students will find the bugs. Try clicking on buttons that you didn’t want the students to click on, clicking on wrong answers, and typing unexpected things. Your students will, and your presentation needs to be prepared for that.

Debugging and error prevention is more of an art form than a science. You will develop your own techniques the more comfortable you get. But debugging and error prevention are very important because you *will* have bugs (fewer if you use the error prevention techniques), and you will need to correct them.

Conclusion

In this chapter you learned about ways to find bugs, how to fix bugs, and how to prevent bugs. Now that you have learned a great many VBA tricks and how to make your code work (or fix it when it doesn’t), you are ready to create your own projects as well as create templates for your students’ projects. The next chapter talks about the idea of creating templates, which provide the framework of a project for your students so they can fill in the content.

Exercises to Try

↳ The following code is not indented. What will happen if Ella types 5? What will happen if anyone else types 5? What will happen if Ella types 10? What will happen if anyone else types 10? Try to figure it out without running the code. Type it into the VBA Editor and indent it properly; see if you come up with a different answer now that it is indented. Run the code to see if you got the right answer.

```
Sub HowDoYouFeel()
Dim score As Integer
Dim userName As String
userName = InputBox("What is your name?")
score = InputBox("On a scale of 1 to 10, how do you feel?")
If score > 5 Then
If score > 7 Then
If score > 9 Then
If userName = "Ella" Then
If score > 10 Then
MsgBox ("That's amazing")
Else
MsgBox ("That's perfect")
End If
ElseIf score < 6 Then
MsgBox ("That's middling")
Else
MsgBox ("You're perfect.")
End If
ElseIf score = 5 Then
MsgBox ("Are you middling?")
Else
MsgBox ("Are you above average?")
End If
ElseIf score = 5 Then
MsgBox ("Right in the middle")
Else
MsgBox ("That's good")
End If
Else
MsgBox ("Not too good.")
End If
End Sub
```

The following is the entire contents of a module. It contains four bugs. Try to find all four by typing the code into the VBA Editor and using the debugging and error prevention methods in this chapter.

```
Sub YourName()
   userName = InputBox("What is your name?")
End Sub
End Sub
Sub BadProcedure()
   YorName
   If userName = "Ella" Then
       MsgBox "Hello, big girl."
   ElseIf userName = "Ada"
       MsgBox "Hello, little girl."
   Else
       MsgBox "Hello, " & userName
   End If
End Sub
```

12

Templates

Introduction

In Chapter 11 you learned the last technical tricks presented in this book and developed a bag of tricks to help you fix any problems that you might encounter. Now you are ready to embark on using all the tricks you have learned to make powerful interactive projects. However, your students might not be ready to make their own powerful interactive projects. This chapter describes templates, a tool you can use to do the technical and design work for your students, allowing them to concentrate on the content. With a template, you can use all the VBA features that you want, and your students can use all those VBA features without even knowing how to open the VBA Editor. This chapter describes templates and provides several examples, including a sophisticated example that asks the user for information and adds a slide with that information.

Vocabulary

- Design Template file
- Template

What Are Templates?

Previous chapters emphasized the use of multimedia projects that are created by the teacher for students to use. As you have read this book and worked through the examples, I hope you have gotten several ideas for projects that you want to create for your students. A more powerful use of multimedia is to have students create their own projects. Many studies have shown the positive educational impact of students designing their own multimedia projects. See, for example, Hernandez-Ramos and De La Paz (2009), Liu and Hsiao (2001), Liu and Rutledge (1997), or Lehrer, Erickson, and Connell (1994). While this can be a powerful educational opportunity, it also can be impractical for a number of reasons, not the least of which are that it is very time-consuming and that your students might lack the technical skills to be successful.

Have no fear. Your students can still get many of the benefits of what you have learned in this book without having to learn it all (or any of it) themselves. That is where templates come in. If you design a project from scratch, you have to decide on the appropriate media, appropriate kinds of information, and appropriate organization for your project. In addition, you have to develop the project (including preparing the media, the PowerPoint slides, the VBA, etc.). A template allows you to create some of these things for your students. Templates have been used to facilitate multimedia creation by professional designers; see, for example, O'Connor (1991). Agnew, Kellerman, and Meyer discusses the use of templates with students: "The primary purpose of giving students a template for their early projects is to allow them to concentrate most of their attention on achieving academic objectives" (1996, p. 250).

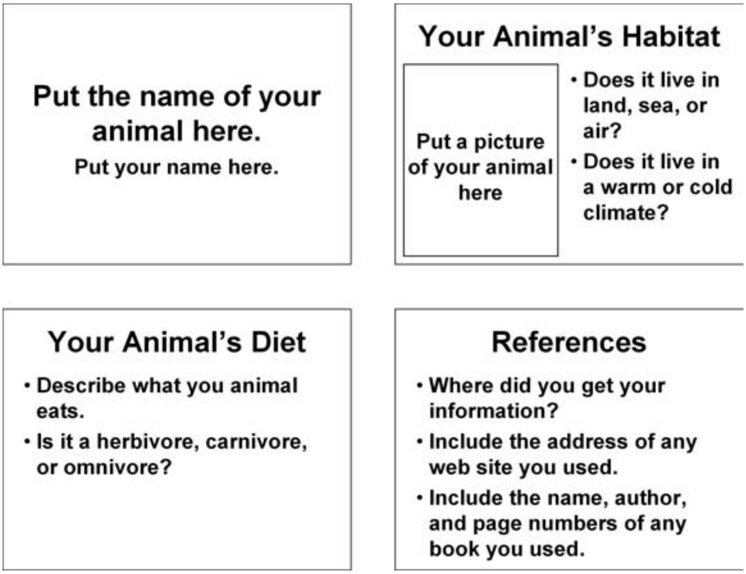
Something as simple as a PowerPoint project about an animal can use a template. You could tell your students that the presentation should contain four slides: a title slide, a slide about the animal's habitat with a picture of the animal, a slide about what the animal eats, and a slide for citing resources. Those simple instructions are a rudimentary template. You have designed the organization of the project for the students.

However, you might go further and actually create the slides for them, giving your students directions about how to fill in the picture and the text. See Figure 12.1 for an example.

Although this is not a complex project, it might be a good one for second graders, for example, who are first being introduced to PowerPoint. This project does not require VBA or hyperlinks or animations or anything but the most basic features of PowerPoint. For a class of students who are new to PowerPoint, by getting them started you can save them hours of computer work and allow them to concentrate on the content.

As projects become more complex, templates become more powerful. You might want to introduce your students slowly to advanced features of PowerPoint, or you might not want to introduce them to some features at all. But you might want them to take full advantage of these features right away.

In Chapter 9 we saw examples of projects that easily can be turned into templates. You might want your students to write quizzes with all the features of VBA that we discussed, but you might not want them to have to deal with VBA. Using the examples from Chapter 9, you can set up a template with no questions or a fake question and give your students instructions about how to add slides and tie the buttons to the appropriate procedures. For the multiple-choice examples, they don't need to change the VBA code at all.



Put the name of your animal here.

Put your name here.

Your Animal's Habitat

Put a picture of your animal here

- Does it live in land, sea, or air?
- Does it live in a warm or cold climate?

Your Animal's Diet

- Describe what you animal eats.
- Is it a herbivore, carnivore, or omnivore?

References

- Where did you get your information?
- Include the address of any web site you used.
- Include the name, author, and page numbers of any book you used.

Figure 12.1. Template for Animal Project

As another template example, chapter 7 of Agnew, Kellerman, and Meyer (1996) discusses a current events project. In this project, each student or group of students creates a single slide about a current event. The slide contains a brief paragraph about the event and a button for the citation and photograph of the event. This project could be done as a template in which the teacher creates all the parts of the project and the students simply add the pictures, citations, and news summaries. In the end, all the slides are put together to form a class collection of current events.

Many topics would work well in a template format. Projects that work especially well are ones in which you would like the students to include a fixed body of information, and each student or group includes the same kind of information about a different topic. For example, school clubs, U.S. presidents, countries in Europe, Spanish verbs, and state flags are all topics that lend themselves well to templates.

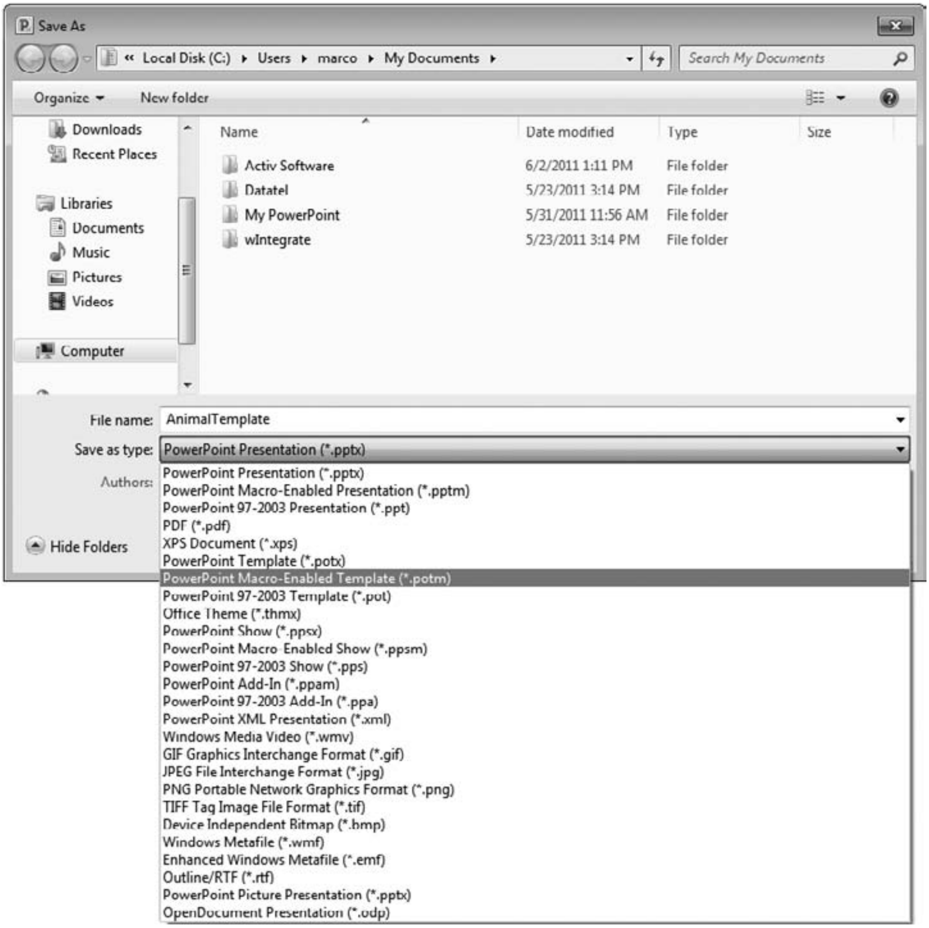
Saving Your Template

When you create a template in PowerPoint, you can save it as a regular PowerPoint presentation (*.pptx or *.pptm or *.ppt) or as a Design Template (*.potx or *.potm or *.pot). If you save it as a regular PowerPoint presentation, you can have your students edit it, and you have to be sure they choose **Save As** from the **File menu** to save it under a new name. If they choose **Save**, it might overwrite the original file and lose the template.

If you save your template as a Design Template, when students double-click on the file to open it, they will be taken to a new presentation that is based on the template. When they save this file, they will be asked to choose a new name and location for the presentation, so it will not overwrite the original template.

To save your presentation as a Design Template, you will have to pay attention to the "Save as type." If you choose, "Design Template" as your file type, it will create a .potx, .potm, or .pot file (see Figure 12.2).

If you save a file as a Design Template, you can edit the template (rather than a project based on the template) by opening the project from within PowerPoint. That is, start PowerPoint and choose **Open** from the **File tab** on the Ribbon (2010), the **Office Button** on the Ribbon (2007), or the **File menu** (all other versions) to open it.



File name: AnimalTemplate

Save as type: PowerPoint Presentation (*.pptx)

Save As
« Local Disk (C:) ▸ Users ▸ marco ▸ My Documents ▸
Search My Documents
Organize ▾
New folder
Downloads
Recent Places
Libraries
Documents
Music
Pictures
Videos
Computer
Name
Date modified
Type
Size
Activ Software 6/2/2011 1:11 PM File folder
Datatel 5/23/2011 3:14 PM File folder
My PowerPoint 5/31/2011 11:56 AM File folder
wIntegrate 5/23/2011 3:14 PM File folder
Authors:
Hide Folders
PowerPoint Presentation (*.pptx)
PowerPoint Macro-Enabled Presentation (*.pptm)
PowerPoint 97-2003 Presentation (*.ppt)
PDF (*.pdf)
XPS Document (*.xps)
PowerPoint Template (*.potx)
PowerPoint Macro-Enabled Template (*.potm)
PowerPoint 97-2003 Template (*.pot)
Office Theme (*.thmx)
PowerPoint Show (*.ppsx)
PowerPoint Macro-Enabled Show (*.ppsm)
PowerPoint 97-2003 Show (*.pps)
PowerPoint Add-In (*.ppam)
PowerPoint 97-2003 Add-In (*.ppa)
PowerPoint XML Presentation (*.xml)
Windows Media Video (*.wmv)
GIF Graphics Interchange Format (*.gif)
JPEG File Interchange Format (*.jpg)
PNG Portable Network Graphics Format (*.png)
TIFF Tag Image File Format (*.tif)
Device Independent Bitmap (*.bmp)
Windows Metafile (*.wmf)
Enhanced Windows Metafile (*.emf)
Outline/RTF (*.rtf)
PowerPoint Picture Presentation (*.pptx)
OpenDocument Presentation (*.odp)

Figure 12.2. Choosing Design Template As the File Type

Once you have created a template, either as a Design Template file or as a regular PowerPoint presentation, you might want to set it to be "Read-only." You can do this within PowerPoint in Windows or outside of PowerPoint on both Mac and Windows. In PowerPoint 2010, choose **Info** from the **File tab** on the Ribbon. Click the button for **Protect Presentation**, and choose **Mark as Final** from the menu that comes down. In 2007, choose **Prepare** from the **Office button** and choose **Mark as Final**.

Alternatively, you can use the Windows or Mac operating system to do this. First close your PowerPoint file. Find the file icon in Windows or Finder. In Windows, right-click on the file, choose **Properties** and check the box for **Read-Only**. On a Mac, select the file by clicking on it once, choose **Get Info** from the **File menu** and check the box for **Locked**. After this, when the file is opened, it will be opened in Read-Only mode, making it less likely that someone will change it.

The Pick-a-Partner Template Project

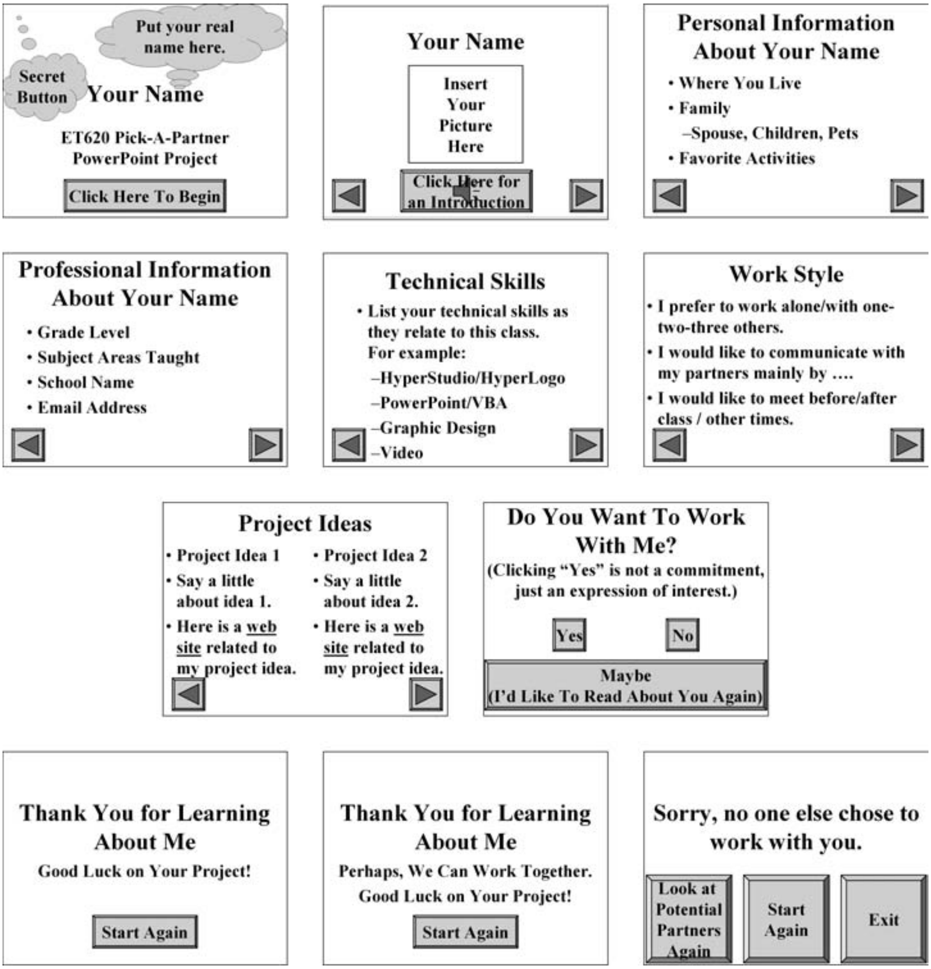
In my Multimedia Design in the Classroom class, I encourage students to form groups to complete their final projects. While this could be done in a number of ways (with or without technology), I also want to be sure my students are up to speed on the traditional features of PowerPoint at the beginning of class. To that end, I have them fill in a PowerPoint template. The template gives my students a chance to brush up on their traditional PowerPoint skills and view the power of VBA without needing to know any VBA. In a less technically oriented class, a similar project could be used for the same purposes. If you plan to use PowerPoint for later projects, you can use a project like this one to introduce your students to some of the features of PowerPoint.

This project is a twist on a common exercise to introduce PowerPoint in which students fill in information about themselves. In my class, this information is specifically related to what they might want to do with their final projects. Figure 12.3 shows the slides for the template.

In the template, clouds represent instructions to the students who will be filling in the content. The students are told to follow the instructions in the clouds and delete the clouds when they are done. In Figure 12.3, the cloud instructions are only shown on the first slide, but I generally include them on all slides.

Once all students fill in the content for their presentations, students rotate around the room looking at each others' presentations. When they reach the "Do You Want To Work With Me?" slide, if they choose "Yes," they are asked for a name, an e-mail address, and a project idea.

Most of the project uses traditional PowerPoint features. The first seven slides use features such as text, sound, pictures, buttons, and hyperlinks. VBA is used in the first slide, the eighth slide, and the last slide to do the following:



Put your real name here.

Secret Button

Your Name

ET620 Pick-A-Partner PowerPoint Project

Click Here To Begin

Your Name

Insert Your Picture Here

Click Here for an Introduction

Personal Information About Your Name

- Where You Live
- Family
  - –Spouse, Children, Pets
- Favorite Activities

Professional Information About Your Name

- Grade Level
- Subject Areas Taught
- School Name
- Email Address

Technical Skills

- List your technical skills as they relate to this class. For example:
  - –HyperStudio/HyperLogo
  - –PowerPoint/VBA
  - –Graphic Design
  - –Video

Work Style

- I prefer to work alone/with one-two-three others.
- I would like to communicate with my partners mainly by ....
- I would like to meet before/after class / other times.

Project Ideas

- Project Idea 1
- Say a little about idea 1.
- Here is a web site related to my project idea.

- Project Idea 2
- Say a little about idea 2.
- Here is a web site related to my project idea.

Do You Want To Work With Me?

(Clicking "Yes" is not a commitment, just an expression of interest.)

Yes No

Maybe (I'd Like To Read About You Again)

Thank You for Learning About Me

Good Luck on Your Project!

Start Again

Thank You for Learning About Me

Perhaps, We Can Work Together. Good Luck on Your Project!

Start Again

Sorry, no one else chose to work with you.

Look at Potential Partners Again

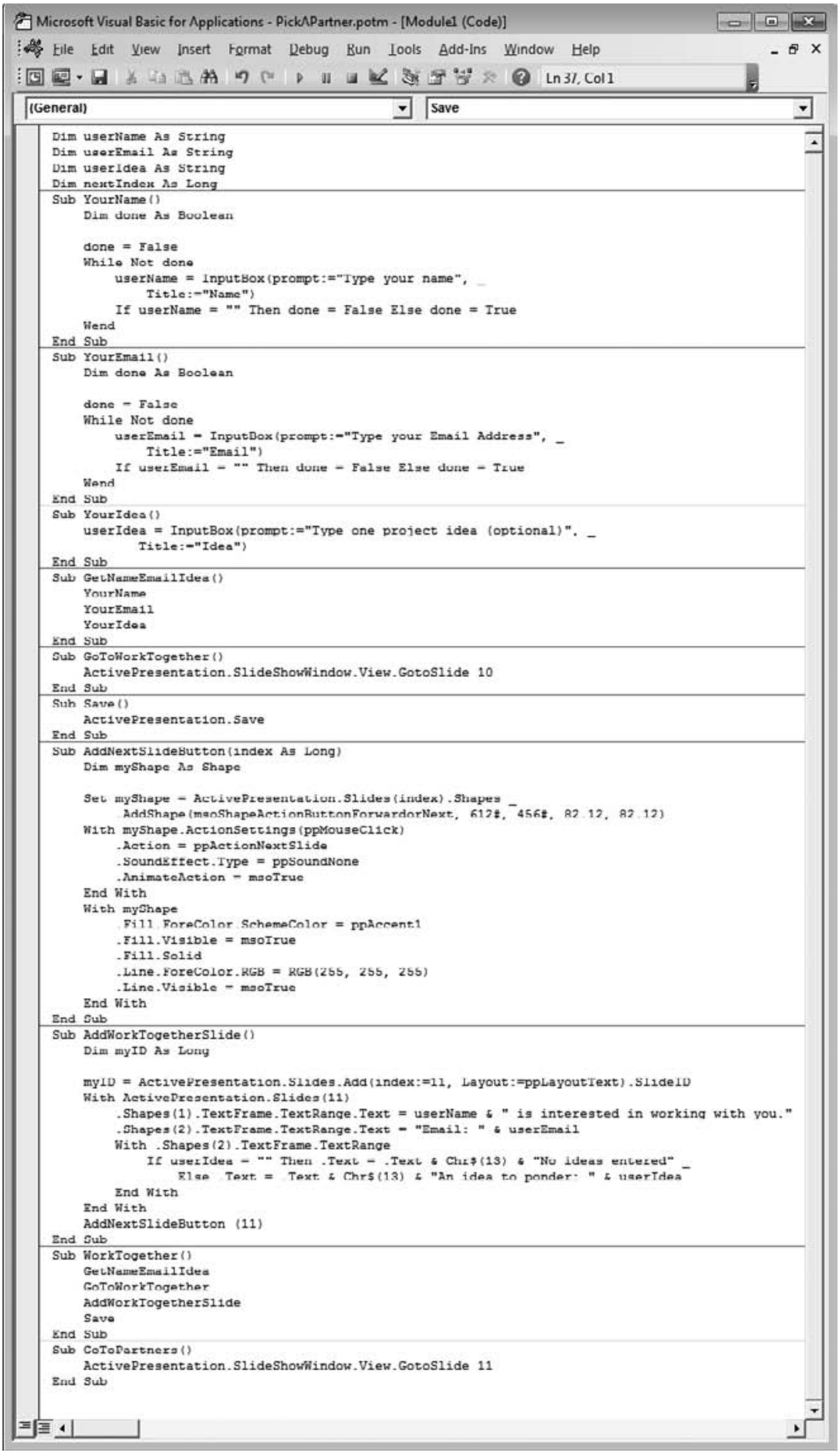
Start Again

Exit

Figure 12.3. Slides for Pick-A-Partner Template

- Some minor navigation tricks were achieved with VBA.
- Users are asked to input name, e-mail address, and project ideas.
- A new slide is created with the information the user inputs and a button to advance to the next slide.
- A button is used to navigate to a particular slide number (not a named slide as is done with standard PowerPoint) so it can reach the slide that was created with VBA.

Figure 12.4 shows the complete code for this project. Remember that because this is a template, my students do not type any of this code. They simply fill in the content in the first seven slides.


Microsoft Visual Basic for Applications - PickAPartner.potm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Ln 37, Col 1
(General)
Save

```
Dim userName As String
Dim userEmail As String
Dim userIdea As String
Dim nextIndex As Long
Sub YourName()
    Dim done As Boolean

    done = False
    While Not done
        userName = InputBox(prompt:="Type your name", _
            Title:="Name")
        If userName = "" Then done = False Else done = True
    Wend
End Sub
Sub YourEmail()
    Dim done As Boolean

    done = False
    While Not done
        userEmail = InputBox(prompt:="Type your Email Address", _
            Title:="Email")
        If userEmail = "" Then done = False Else done = True
    Wend
End Sub
Sub YourIdea()
    userIdea = InputBox(prompt:="Type one project idea (optional)", _
           Title:="Idea")
End Sub
Sub GetNameEmailIdea()
    YourName
    YourEmail
    YourIdea
End Sub
Sub GoToWorkTogether()
    ActivePresentation.SlideShowWindow.View.GotoSlide 10
End Sub
Sub Save()
    ActivePresentation.Save
End Sub
Sub AddNextSlideButton(index As Long)
    Dim myShape As Shape

    Set myShape = ActivePresentation.Slides(index).Shapes _
         .AddShape(msoShapeActionButtonForwardorNext, 612#, 456#, 82.12, 82.12)
    With myShape.ActionSettings(ppMouseClick)
        .Action = ppActionNextSlide
        .SoundEffect.Type = ppSoundNone
        .AnimateAction = msoTrue
    End With
    With myShape
        .Fill.ForeColor.SchemeColor = ppAccent1
        .Fill.Visible = msoTrue
        .Fill.Solid
        .Line.ForeColor.RGB = RGB(255, 255, 255)
        .Line.Visible = msoTrue
    End With
End Sub
Sub AddWorkTogetherSlide()
    Dim myID As Long

    myID = ActivePresentation.Slides.Add(index:=11, Layout:=ppLayoutText).SlideID
    With ActivePresentation.Slides(11)
        .Shapes(1).TextFrame.TextRange.Text = userName & " is interested in working with you."
        .Shapes(2).TextFrame.TextRange.Text = "Email: " & userEmail
        With .Shapes(2).TextFrame.TextRange
            If userIdea = "" Then .Text = .Text & Chr$(13) & "No ideas entered" _
                Else .Text = .Text & Chr$(13) & "An idea to ponder: " & userIdea
        End With
    End With
    AddNextSlideButton (11)
End Sub
Sub WorkTogether()
    GetNameEmailIdea
    GoToWorkTogether
    AddWorkTogetherSlide
    Save
End Sub
Sub GoToPartners()
    ActivePresentation.SlideShowWindow.View.GotoSlide 11
End Sub
```

Figure 12.4. Pick-A-Partner VBA Code

On the first slide, the secret button (the invisible button in the upper left corner) is tied to the procedure GoToPartners. This procedure goes to the eleventh slide. Normally, this could be done with a traditional hyperlink, but in this case, the eleventh slide is going to be created with VBA. A traditional hyperlink cannot link to a slide that does not yet exist. On the last slide, the “Look at Potential Partners Again” button also is tied to GoToPartners for the same reason.

The only other button that uses VBA is the “Yes” button on the eighth slide. When users decide they want to work with you, they click on this button to initiate a series of events. This button is tied to the WorkTogether procedure, which controls this series of events.

The WorkTogether procedure calls all the procedures needed to make everything happen. When I took my first computer course, the instructor told us to think about what we wanted our program to do and write a top-level procedure to call other procedures to do it. Then, he suggested that you have finished something important and you should go have a beer. That is what the WorkTogether procedure does. Go have a beer (if you are of legal drinking age, not driving, not pregnant, etc.)! This procedure does all of the following:

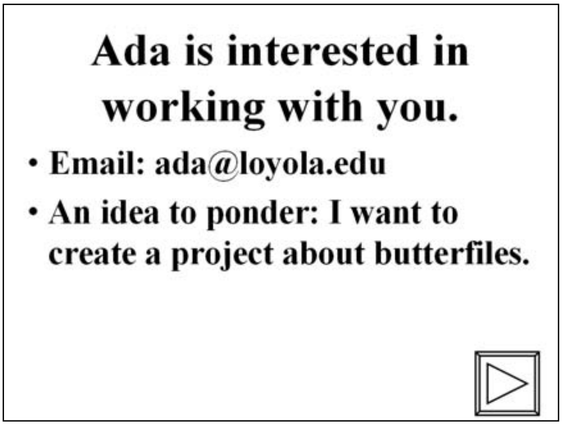
- It asks the user to input a name, e-mail address, and project idea (GetNameEmailIdea).
- It jumps to the tenth slide, thanking the user for wanting to work with you (GoToWorkTogether).
- It creates a new slide that contains the name, e-mail, address, and project idea (AddWorkTogetherSlide),
- It saves the presentation so the newly added slide becomes part of the presentation (Save).

The procedures YourName, YourEmail, and YourIdea are all variations of the YourName procedure from earlier chapters. Although any version of YourName will work, YourName and YourEmail use a version that forces the user to type something. Because giving a project idea is optional, YourIdea uses a version that does not require the user to type anything. The name, e-mail address, and project idea are stored in the variables userName, userEmail, and userIdea respectively. At the appropriate time, all three of these procedures are called in succession by the GetNameEmailIdea procedure, which simply calls each of these procedures in turn. However, GetNameEmailIdea is not tied directly to any buttons because when users press the button to say they want to be your partner, all the magic happens (coordinated by the WorkTogether procedure), not just the input part.

The GoToWorkTogether procedure is simply a navigational procedure that goes to the tenth slide because that is the slide that contains the message “Thank You For Learning About Me. Perhaps We Can Work Together.” This, by itself, could easily be done with traditional PowerPoint actions, but this is one of many things that happen when a single button is pressed; that is, it is part of all the things that WorkTogether does.

The procedure Save simply saves the presentation (as described in Chapter 8). This is simple, but it can’t be done by the user in Slide Show View without a button and procedure.

The AddWorkTogetherSlide procedure is the real workhorse. It creates a slide like that shown in Figure 12.5.



Ada is interested in working with you.

- **Email: ada@loyola.edu**
- **An idea to ponder: I want to create a project about butterfiles.**

Figure 12.5. Example of Slide Created When Someone Has Chosen to Work with You

This slide will be inserted as the eleventh slide. The following line creates the new slide:

```
ActivePresentation.Slides.Add index:=11, Layout:=ppLayoutText
```

The index:=11 ensures that the new slide will always be the eleventh slide in the presentation. The Layout:=ppLayoutText makes it a standard text slide with a title and one text area.

Next, we want to add the appropriate text to the slide: the user’s name in the title area with a brief message; the user’s e-mail address in the text box; and the user’s idea (if any) in the text box. The code that adds this follows.

```
With ActivePresentation.Slides(11)
   .Shapes(1).TextFrame.TextRange.Text = userName & _
      " is interested in working with you."
   .Shapes(2).TextFrame.TextRange.Text = "Email: " & userEmail
   With .Shapes(2).TextFrame.TextRange
      If userIdea = "" Then .Text = .Text & Chr$(13) & _
         "No ideas entered" _
         Else .Text = .Text & Chr$(13) & "An idea to ponder: " & userIdea
   End With
End With
```

This uses a couple of With blocks (see Chapter 7) and some fairly simple text ideas (see also Chapter 7). The .Shapes(1) line sets the text in the title area of the slide. The .Shapes(2) line puts the email address in the text area of the slide. Then, the With block (through End With) adds the user's idea to the text area, or, if the user has no idea, it adds the text "No ideas entered." It's simpler than it looks.

Finally, the AddNextSlideButton procedure is called to add a button to go to the next slide:

```
AddNextSlideButton (11)
```

The AddNextSlideButton procedure creates a button on any slide. We call it with 11, so it will create a button on the eleventh slide and index will be set to whatever number you call AddNextSlideButton with (see "Parameters" in Chapter 9 for more information about parameters).

```
Sub AddNextSlideButton(index As Long)
   Dim myShape As Shape

   Set myShape = ActivePresentation.Slides(index).Shapes. _
      AddShape(msoShapeActionButtonForwardorNext, _
      612#, 456#, 82.12, 82.12)
   With myShape.ActionSettings(ppMouseClick)
      .Action = ppActionNextSlide
      .SoundEffect.Type = ppSoundNone
      .AnimateAction = msoTrue
   End With
   With myShape
      .Fill.ForeColor.SchemeColor = ppAccent1
      .Fill.Visible = msoTrue
      .Fill.Solid
      .Line.ForeColor.RGB = RGB(255, 255, 255)
      .Line.Visible = msoTrue
   End With
End Sub
```

In this procedure, the Set line creates the button and sets myShape to point to it. msoShapeActionButtonForwardorNext creates it as a button with a forward-pointing arrow. The first With block sets the action (this is what makes it go to the next slide) with the line .Action = ppActionNextSlide. The other lines in the first With block aren't really necessary but complete the action features of the button.

The second With block sets colors (specifically Fill and Line colors). If you are using the default color scheme, this entire With block is unnecessary, but you can play with the parameters to see how the buttons that are created change.

When using a template with VBA in PowerPoint 2007 or later, it is very important that your students know how to save the file as a macro-enabled file (*.pptm or *.ppsm). Otherwise, the macros will be stripped out of the file when they save it, and none of the VBA will work.

Conclusion

In this chapter, you have learned the power of templates. Sometimes you want your students to work on technical skills, but technology in the classroom primarily is a tool for learning the curriculum. As a teacher, you need to balance the use of technology with the needs of the curriculum. If the technology demands are too great, the curriculum will be lost. Templates are the perfect solution for many tasks. If you want your students to use powerful technological features, such as the VBA features of PowerPoint, but you don't want them to focus on the technology, you can create a template with all the features they need, so they can focus on the curriculum but still get the advantage of the powerful features.

You can use templates with your students with early projects while they are still getting used to PowerPoint, or you can use templates for all projects. Templates do not need to include advanced features such as VBA. Even the simplest templates (such as the Animal Project in Figure 12.1, p. 249) can be used to focus your students and limit the amount of technology and design they have to understand.

Exercises to Try

- Create a simple presentation (possibly something like the Animal Project shown in Figure 12.1). Save it as a Design Template. Quit PowerPoint and double-click on your template. Observe what happens when you try to save the presentation that is opened.
- Pick one of the projects from earlier chapters in this book (the quizzes in Chapter 9 work well as templates) and create a template for your students. Set it up to include all the VBA that is needed, all the basic slides that are needed, and instructions for your students so they know what to do with the project. For example, if you choose a quiz format, you can create the title slide, one question slide, and the feedback slide while giving instructions for how to add new slides and tie the right and wrong answers to the procedures that you have already included.

Epilogue

We have concluded our journey through the scripting features of PowerPoint. But I hope this journey has been only a beginning for you. The book has focused on technical features of PowerPoint, but along the way you have learned some interesting ways to apply the technology with your students because that is the most important thing. You might find it fun to sit around and play with the technical features of PowerPoint, but the bottom line is how it will improve your teaching and your students' learning.

Start small. Create some simple presentations for your students. Don't try to conquer PowerPoint and VBA all at once. A few interactive quizzes won't revolutionize your classroom, but it is a beginning. As you conquer more and more of the examples in this book, you might be ready to create your own examples, or you might want to find more examples. Check out the website that accompanies this book at http://www.PowerfulPowerPoint.com/. It contains more examples from the author and the opportunity for you to share your own examples and find examples that other readers have shared.

This book was written for scripters. You should be able to copy examples directly from the book and make minor modifications to insert your own content. Many of you will be satisfied to remain a scripter. Just using what is in the book and on the website should provide you with a rich set of examples that you can apply to many situations. However, some of you will want more. You will want to create things unlike anything in this book. You will want to become programmers. While there currently are no other books geared to educational uses of PowerPoint and VBA, you might be ready for a book that focuses on VBA. Look in the References section for McFedries (1999) or Mansfield (2010), or, better yet, go to your local bookstore (or search inside a few books at Amazon or Google Books) and browse through a few books. Learning to program is a very personal experience, and a book that one person likes won't make any sense to another. Find one with the right balance of explanations and examples and details that work for you.

As an educator, your focus has to be on the learning of your students. The most important next step is to expand how you can apply multimedia in your classroom. You can do this by creating more and more sophisticated presentations for your students or by expanding your students' role in multimedia production. Chapters 1 and 12 introduced this topic briefly, and you can find more information in Ivers and Barron (2010) and Agnew, Kellerman, and Meyer (1996). If you want to make media production a focal point of your classroom, you might want to check out Counts (2004). If your focus is more on your own media production in a school setting or outside of the schools, you might be interested in Alessi and Trollip (2001), which will take you in the direction of becoming a professional multimedia designer.

Using multimedia that you create and having your students create multimedia can have a powerful impact on the curriculum, and it can help students understand media and gain a level of media literacy. For more information about media literacy, look for the Center for Media Literacy (n.d.) at http://www.medialit.org/.

Your journey is just beginning. You have the power to improve your students' learning. You have the power to use PowerPoint to engage and interact with your students. Technology is not always easy to use, but if you have come this far, you have mastered another piece of powerful technology to help your students learn. Don't stop here. Create exciting interactive presentations. Have your students create exciting interactive presentations. Share your successes, get help with your frustrations, and keep in touch at our website: http://www.PowerfulPowerPoint.com/.

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