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REVISED Sixth Edition



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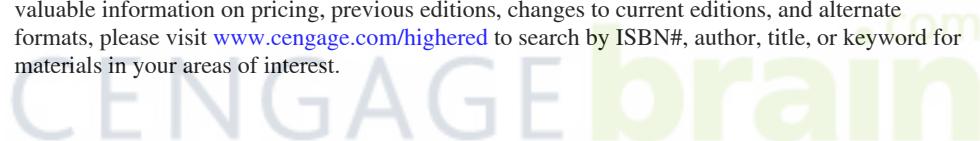


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REVISED Sixth Edition**

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PREFACE

The future of many organizations depends on their ability to harness the power of information technology, and good project managers continue to be in high demand. Colleges have responded to this need by establishing courses in project management and making them part of the information technology, management, engineering, and other curriculum. Corporations are investing in continuing education to help develop effective project managers and project teams. This text provides a much-needed framework for teaching courses in project management, especially those that emphasize managing information technology projects. The first five editions of this text were extremely well received by people in academia and the workplace. The Sixth Edition builds on the strengths of the previous editions and adds new, important information and features.

It's impossible to read a newspaper, magazine, or Web page without hearing about the impact of information technology on our society. Information is traveling faster and being shared by more individuals than ever before. You can buy just about anything online, surf the Web on a mobile phone, or use a wireless Internet connection at your local coffee shop. Companies have linked their many systems together to help them fill orders on time and better serve their customers. Software companies are continually developing new products to help streamline our work and get better results. When technology works well, it is almost invisible. But did it ever occur to you to ask, "Who makes these complex technologies and systems happen?"

Because you're reading this text, you must have an interest in the "behind-the-scenes" aspects of technology. If I've done my job well, as you read you'll begin to see the many innovations society is currently experiencing as the result of thousands of successful information technology projects. In this text, you'll read about IT projects around the world that went well, including Mittal Steel Poland's Implementation of SAP project that unified IT systems to improve business and financial processes; Dell Earth and other green computing projects that save energy and millions of dollars; and Six Sigma projects such as the project to improve case load management at Baptist St. Anthony's Hospital in Amarillo, Texas; the systems infrastructure project at the Boots Company in the United Kingdom that is taking advantage of supplier competition to cut costs and improve services; Kuala Lumpur's state-of-the-art Integrated Transport Information System (ITIS) project; and many more. Of course, not all projects are successful. Factors such as time, money, and unrealistic expectations, among many others, can sabotage a promising effort if it is not properly managed. In this text, you'll also learn from the mistakes made on many projects that were not successful. I have written this book in an effort to educate you, tomorrow's project managers, about what will help make a project succeed—and what can make it fail. You'll also see how projects are used in everyday media, such as television and film, and how companies use best practices in project management. Many readers tell me how much they enjoy reading these real-world examples in the What Went Right?, What Went Wrong?, Media Snapshot, and Best Practice features. As practitioners know, there is no "one size fits all" solution to

managing projects. By seeing how different organizations successfully implement project management, you can help your organization do the same.

Although project management has been an established field for many years, managing information technology projects requires ideas and information that go beyond standard project management. For example, many information technology projects fail because of a lack of user input, incomplete and changing requirements, and a lack of executive support. This book includes suggestions on dealing with these issues. New technologies can also aid in managing information technology projects, and examples of using software to assist in project management are included throughout the book.

Information Technology Project Management, REVISED Sixth Edition, is still the only textbook to apply all nine project management knowledge areas—project integration, scope, time, cost, quality, human resource, communications, risk, and procurement management—and all five process groups—initiating, planning, executing, monitoring and controlling, and closing—to information technology projects. This text builds on the *PMBOK® Guide, Fourth Edition*, an American National Standard, to provide a solid framework and context for managing information technology projects. It also includes an appendix, *Guide to Using Microsoft Project 2010*, which many readers find invaluable. A second appendix provides advice on earning and maintaining Project Management Professional (PMP) certification from the Project Management Institute (PMI) as well as information on other certification programs, such as CompTIA's Project+ certification. A third appendix provides new case studies and information on using simulation software to help readers apply their project management skills.

Information Technology Project Management, REVISED Sixth Edition, provides practical lessons in project management for students and practitioners alike. By weaving together theory and practice, this text presents an understandable, integrated view of the many concepts, skills, tools, and techniques involved in information technology project management. The comprehensive design of the text provides a strong foundation for students and practitioners in project management.

New to the REVISED Sixth Edition

Building on the success of the previous editions, *Information Technology Project Management, REVISED Sixth Edition*, introduces a uniquely effective combination of features. The main changes made to the REVISED Sixth Edition only involve Appendix A. We know that faculty cannot update texts every single year, so this revision only provides you the option of teaching your students with the latest edition of Microsoft Project, Project 2010. The Beta release has been out for several months, and the final product should be available in summer 2010.

Appendix A has been thoroughly updated based on Microsoft Project 2010. There are many updates in Project 2010. In addition to adopting the Ribbon interface, Project 2010 provides a manual scheduling option, a simple Timeline feature, and a Team Planner view to easily assign people to tasks and reduce overallocations.

The main changes between the Sixth Edition and the Fifth Edition include the following:

- Several changes were made to synchronize the Sixth Edition with the *PMBOK® Guide, Fourth Edition*, which PMI published in December 2008. Several

processes have changed, a few have been deleted, and a few have been added. For example, project scope management now includes a process for collecting requirements, which produces requirements documentation, a requirements management plan, and a requirements traceability matrix as outputs. This text describes this and other new processes and provides more details and examples of their outputs.

- Appendix C, Additional Running Cases, provides two new cases and information about using Fissure's simulation software. One of the new cases focuses on green computing projects, and the other involves finding or creating video clips related to project management. There is also a running case at the end of each knowledge area chapter, and the old cases from the Fifth Edition text are available on the new companion (premium) Web site. Several additional exercises are also provided at the end of chapters.
- A new Jeopardy-like game is provided on the companion (premium) Web site to help students study important concepts from each chapter in a fun and engaging way.
- A new companion (premium) Web site for the Sixth Edition (www.cengage.com/mis/schwalbe) provides you with access to informative links from the end notes, lecture notes, interactive quizzes, templates, additional running cases, suggested readings, podcasts, the new Jeopardy-like game, and many other items to enhance your learning.

ACCESSING THE COMPANION (PREMIUM) WEB SITE

To access the companion (premium) Web site, open a Web browser and go to www.cengage.com/login. Locate your companion (premium) access card in the front of each new book purchase, and click "Create My Account" to begin the registration process. If you've purchased a used book, please search for ***Information Technology Project Management, Sixth Edition*** at www.CengageBrain.com where you can purchase instant access.

- Updated examples are provided throughout the text. You'll notice several new examples in the Sixth Edition that explain recent events in managing real information technology projects. Several of the What Went Right?, What Went Wrong?, Media Snapshot, and Best Practice examples have been updated to keep you up-to-date. Additional examples and results of new studies are also included throughout the text, with appropriate citations.
- User feedback is incorporated. Based on feedback from reviewers, students, instructors, practitioners, and translators (this book has been translated into Chinese, Japanese, Russian, and Czech), you'll see several additional changes to help clarify information.

Approach

Many people have been practicing some form of project management with little or no formal study in this area. New books and articles are being written each year as we discover more about the field of project management, and project management software continues to

advance. Because the project management field and the technology industry change rapidly, you cannot assume that what worked even a few years ago is still the best approach today. This text provides up-to-date information on how good project management and effective use of software can help you manage projects, especially information technology projects. Five distinct features of this text include its relationship to the Project Management Body of Knowledge, its detailed guide for using Microsoft Project 2010, its value in preparing for Project Management Professional and other certification exams, its inclusion of running case studies and online templates, and its companion (premium) Web site. You can also purchase a special bundling of this text that includes simulation software by Fissure, or you can order the Fissure simulation separately.

Based on the *PMBOK® Guide, Fourth Edition*

The Project Management Institute (PMI) created the Guide to the Project Management Body of Knowledge (the *PMBOK® Guide*) as a framework and starting point for understanding project management. It includes an introduction to project management, brief descriptions of all nine project management knowledge areas, and a glossary of terms. The *PMBOK® Guide* is, however, just that—a guide. This text uses the *PMBOK® Guide, Fourth Edition-like* (December 2008) as a foundation, but goes beyond it by providing more details, highlighting additional topics, and providing a real-world context for project management. Information Technology Project Management, Sixth Edition, explains project management specifically as it applies to managing information technology projects in the twenty-first century. It includes several unique features to bring you the excitement of this dynamic field (for more information on features, see the section entitled “Pedagogical Features”).

Contains a Detailed Guide on How to Use Microsoft Project 2010

Software has advanced tremendously in recent years, and it is important for project managers and their teams to use software to help manage information technology projects. Each copy of *Information Technology Project Management, REVISED Sixth Edition*, includes a detailed guide in Appendix A on using the leading project management software on the market—Microsoft Project 2010. Examples using Project and other software tools are integrated throughout the text, not as an afterthought. Appendix A, Guide to Using Microsoft Project 2010, teaches you in a systematic way to use this powerful software to help in project scope, time, cost, human resource, and communications management.

Resource for PMP and Other Certification Exams

Professional certification is an important factor in recognizing and ensuring quality in a profession. PMI provides certification as a Project Management Professional (PMP), and this text is an excellent resource for studying for the certification exam. This text will also help you pass other certification exams, such as CompTIA's Project+ exam. Having experience working on projects does not mean you can easily pass the PMP or other certification exams.

I like to tell my students a story about taking a driver's license test after moving to Minnesota. I had been driving very safely and without accidents for over 16 years, so I thought I could just walk in and take the test. I was impressed by the sophisticated computer system used to administer the test. The questions were displayed on a large touch-screen monitor,

often along with an image or video to illustrate different traffic signs or driving situations. I became concerned when I found I had no idea how to answer several questions, and I was perplexed when the test seemed to stop and a message displayed saying, “Please see the person at the service counter.” This was a polite way of saying I had failed the test! After controlling my embarrassment, I picked up one of the Minnesota driving test brochures, studied it for an hour or two that night, and successfully passed the test the next day.

The point of this story is that it is important to study information from the organization that creates the test and not be overconfident that your experience is enough. Because this text is based on PMI’s *PMBOK® Guide, Fourth Edition*, it provides a valuable reference for studying for PMP certification. It is also an excellent reference for CompTIA’s Project+ exam. I have earned both of those certifications and kept them in mind when writing this text.

Provides Exercises, Running Cases, Templates, Sample Documents, and Optional Simulation Software

Based on feedback from readers, the Sixth Edition continues to provide challenging exercises and running cases to help students apply concepts in each chapter. There are over 50 templates, examples of real project documents, and optional simulation software developed by Fissure, a PMI Registered Education Provider, that you can use to actively practice your skills in managing a project. All of these features help the subject matter come alive and have more meaning.

Includes a Companion (Premium) Web site

A companion (premium) Web site provides you with a one-stop location to access informative links and tools to enhance your learning. Similar to other companion (premium) Web sites provided by Course Technology, this site will be a valuable resource as you view lecture notes, templates, interactive quizzes, podcasts, student files for Project 2010, important articles, references, and more. You can also link to the author’s site to see real class syllabi, samples of student projects, and other helpful links.

Organization and Content

Information Technology Project Management, REVISED Sixth Edition, is organized into three main sections to provide a framework for project management, a detailed description of each project management knowledge area, and three appendices to provide practical information for applying project management. The first three chapters form the first section, which introduces the project management framework and sets the stage for the remaining chapters.

Chapters 4 through 12 form the second section of the text, which describes each of the project management knowledge areas—project integration, scope, time, cost, quality, human resource, communications, risk, and procurement management—in the context of information technology projects. An entire chapter is dedicated to each knowledge area. Each knowledge area chapter includes sections that map to their major processes as described in the *PMBOK® Guide, Fourth Edition*. For example, the chapter on project quality management includes sections on planning quality, performing quality assurance, and performing quality control. Additional sections highlight other important concepts related to each knowledge area, such as Six Sigma, testing, maturity models, and using software to

assist in project quality management. Each chapter also includes detailed examples of key project management tools and techniques as applied to information technology projects. For example, the chapter on project integration management includes samples of various project-selection documents, such as net present value analyses, ROI calculations, payback analyses, and weighted scoring models. The project scope management chapter includes a sample project charter, a project scope statement, and several work breakdown structures for information technology projects.

Appendices A through C form the third section of the text, which provides practical information to help you apply project management skills on real or practice projects. By following the detailed, step-by-step guide in Appendix A, which includes more than 60 screen shots, you will learn how to use Project 2010. Appendix B summarizes what you need to know to earn PMP or other certifications related to project management. Appendix C provides additional running cases and information on using simulation software to help you practice your new skills.

Pedagogical Features

Several pedagogical features are included in this text to enhance presentation of the materials so that you can more easily understand the concepts and apply them. Throughout the text, emphasis is placed on applying concepts to current, real-world information technology project management.

Learning Objectives, Chapter Summaries, Discussion Questions, Exercises, Quick Quizzes, Running Cases, and Companion (Premium) Web site

Learning Objectives, Chapter Summaries, Quick Quizzes, Discussion Questions, Exercises, Running Cases, and the companion (premium) Web site are designed to function as integrated study tools. Learning Objectives reflect what you should be able to accomplish after completing each chapter. Chapter Summaries highlight key concepts you should master.

The Discussion Questions help guide critical thinking about those key concepts. Quick Quizzes test knowledge of essential chapter concepts and include an answer key. Exercises provide opportunities to practice important techniques, as do the Running Cases. The companion (premium) Web site provides several study aids, such as podcasts, the new Jeopardy-like game, and interactive quizzes for each chapter, which are different from the Quick Quizzes in the text.

Opening Case and Case Wrap-Up

To set the stage, each chapter begins with an opening case related to the material presented in that chapter. These “real-life” case scenarios (most based on the author’s experiences) spark student interest and introduce important concepts in a real-world context. As project management concepts and techniques are discussed, they are applied to the opening case and other similar scenarios. Each chapter then closes with a case wrap-up—with some ending successfully and some, realistically, failing—to further illustrate the real world of project management.

What Went Right? and What Went Wrong?

Failures, as much as successes, can be valuable learning experiences. Each chapter of the text includes one or more examples of real information technology projects that went right

as well as examples of projects that went wrong. These examples further illustrate the importance of mastering key concepts in each chapter.

Media Snapshot

The world is full of projects. Several televisions shows, movies, newspapers, Web sites, and other media highlight project results, good and bad. Relating project management concepts to all types of projects highlighted in the media will help you understand and see the importance of this growing field. Why not get people excited about studying project management by showing them how to recognize project management concepts in popular television shows, movies, or other media?

Best Practice

Every chapter includes an example of a best practice related to topics in that chapter. For example, Chapter 1 describes best practices written by Robert Butrick, author of *The Project Workout*, from the *Ultimate Business Library's Best Practice* book. He suggests that organizations ensure their projects are driven by their strategy and engage project stakeholders.

Key Terms

The fields of information technology and project management both include many unique terms that are vital to creating a workable language when the two fields are combined. Key terms are displayed in bold face and are defined the first time they appear. Definitions of key terms are provided in alphabetical order at the end of each chapter and in a glossary at the end of the text.

Application Software

Learning becomes much more dynamic with hands-on practice using the top project management software tool in the industry, Microsoft Project 2010, as well as other tools, such as spreadsheet software and the Internet. Each chapter offers you many opportunities to get hands-on experience and build new software skills. This text is written from the point of view that reading about something only gets you so far—to really understand project management, you have to do it for yourself. In addition to the exercises and running cases found at the end of each chapter and in Appendix C, several challenging exercises are provided at the end of Appendix A, Guide to Using Microsoft Project 2010.

SUPPLEMENTS

The following supplemental materials are available when this text is used in a classroom setting. All of the teaching tools available with this text are provided to the instructor on a single CD-ROM.

- **Electronic Instructor's Manual** The Instructor's Manual that accompanies this textbook includes additional instructional material to assist in class preparation, including suggestions for lecture topics and additional discussion questions.
- **ExamView®** This textbook is accompanied by ExamView, a powerful testing software package that allows instructors to create and administer printed,

computer (LAN-based), and Internet exams. ExamView includes hundreds of questions that correspond to the topics covered in this text, enabling students to generate detailed study guides that include page references for further review. The computer-based and Internet testing components allow students to take exams at their computers, and also save the instructor time by grading each exam automatically.

- **PowerPoint Presentations** This text comes with Microsoft PowerPoint slides for each chapter. These are included as a teaching aid for classroom presentation, to make available to students on the network for chapter review, or to be printed for classroom distribution. Instructors can add their own slides for additional topics they introduce to the class.
- **Solution Files** Solutions to end-of-chapter questions can be found on the Instructor Resource CD-ROM and may also be found on the Course Technology Web site at www.cengage.com/mis/schwalbe. The solutions are password-protected.
- **Distance Learning** Course Technology is proud to present online courses in WebCT and Blackboard, to provide the most complete and dynamic learning experience possible. When you add online content to one of your courses, you're adding a lot: self tests, links, glossaries, and, most of all, a gateway to the twenty-first century's most important information resource. We hope you will make the most of your course, both online and offline. For more information on how to bring distance learning to your course, contact your Course Technology sales representative.

ACKNOWLEDGMENTS

I never would have taken on this project—writing this book, the first, second, third, fourth, fifth, and sixth edition—without the help of many people. I thank the staff at Course Technology for their dedication and hard work in helping me produce this book and in doing such an excellent job of marketing it. Kate Mason (formerly Hennessy), Deb Kaufmann, Matthew Hutchinson, Patrick Franzen, and many more people did a great job in planning and executing all of the work involved in producing this book.

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I also thank my students and colleagues at Augsburg College and the University of Minnesota for providing feedback on the earlier editions of this book. I received many valuable comments from them on ways to improve the text and structure of my courses. I learn something new about project management and teaching all the time by interacting with students, faculty, and staff.

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Most of all, I am grateful to my family. Without their support, I never could have written this book. My wonderful husband, Dan, has always supported me in my career, and he helps me keep up-to-date with software development since he is a lead architect for ComSquared Systems, Inc. Our three children, Anne, Bobby, and Scott, actually think it's cool that their mom writes books and speaks at conferences. They also see me managing projects all the time. Anne, now 25, teases me for being the only quilter she knows who treats each quilt as a project. (Maybe that's why I get so many done!) Our children all understand the main reason why I write—I have a passion for educating future leaders of the world, including them.

As always, I am eager to receive your feedback on this book. Please send comments to me at schwalbe@augsburg.edu.

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A
APPENDIX**GUIDE TO
USING MICROSOFT
PROJECT 2010**

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INTRODUCTION

This appendix provides a concise guide to using Microsoft Office Project Professional 2010 (often referred to as Project 2010) to assist in performing project management functions. The Office Project 2010 family includes several different products:

- Project Standard 2010, a non-Web-based, stand-alone program for individuals who manage projects independently, similar to earlier versions of Project Standard.
- Project Professional 2010, which is basically Project Standard 2010 plus the ability to connect to Project Server 2010, if available. (Note: This guide does not include information on connecting to Project Server 2010.)
- Project Server 2010, built on SharePoint Server 2010, delivers flexible work management solutions across organizations, departments, and teams. Organizations should develop and apply many standards, templates, codes, and procedures before using Project Server 2010 to make the best use of its capabilities.

Each version of Project 2010 can help users manage different aspects of all nine project management knowledge areas. (Consult Microsoft's Web site for more details on all of the versions of Project 2010.) Most users, however, focus on using Project 2010 to assist with scope, time, cost, human resource, and communications management. This guide uses these project management knowledge areas as the context for learning how to use Project 2010. The basic order of steps in this appendix follows best practices in project management. That is, you should first determine the scope of a project, then the time, and then the resource and cost information. You can then set a baseline and enter actuals to track and communicate performance information.

Hundreds of project management software products are available today, but Microsoft Project is the clear market leader among midrange applications. Before you can use Project 2010 or any project management software effectively, you must understand the fundamental concepts of project management, such as creating work breakdown structures, linking tasks, entering duration estimates, and so on. See the Suggested Readings on the companion Web site (www.cengage.com/mis/schwalbe) for recommendations on other resources to help you gain an even deeper understanding of Project 2010.

New Features of Project 2010*

Project 2010 is not just a run-of-the-mill update. Microsoft really listened to users and has revised Project to meet user needs. Learning some of the new features might seem like a chore, but it is well worth the effort.

If you are familiar with Project 2007, it may be helpful to review some of the new features in Project 2010.

- *Improved user interface:* Project 2010 now includes the “ribbon” interface instead of using the traditional menus and toolbars similar to Office 2003. Commands are organized in logical groups under tabs, such as File, Task, Resource, Project, View, and Format. The File tab takes you to the new Backstage feature, a one-stop graphical destination for opening, saving, and printing your files. You can also now right-click different items, like a table cell or chart, to bring up commonly used commands quickly.
- *New viewing options:* Project 2010 includes several new views. A timeline view shows you a concise overview of the entire project schedule. You can easily add tasks to the timeline, print it, or paste it into an e-mail. The new team planner view lets you quickly see what your team members are working on, and you can move tasks from one person to another using this view. For example, if a resource is overallocated, you can drag a task to another resource to remove the overallocation. You can also add new columns quickly and use the new Zoom Slider at the lower right of the screen to zoom your schedule in and out. Also, the tab for viewing and printing reports is easier to navigate with more options for visual reports.
- *Manual scheduling:* Unlike previous versions of Project where tasks were automatically scheduled, Project 2010 uses manual schedule as its default. In past versions of Project, summary tasks were automatically calculated based on their subtasks. Resources were also adjusted automatically. With Project

*From Schwalbe's *An Introduction to Project Management, Third Edition*, 2010.

2010, this is no longer the case. For example, you might want to enter durations for summary tasks and then fill in the detailed information for their sub-tasks later. When you open a new file, Project reminds you that new tasks are manually scheduled and lets you easily switch to automatic scheduling, if desired. You can also use the new compare versions to see Gantt bars to more clearly see how one version of a project differs from another version.

- *Improved collaboration:* Project 2010 can provide an interface with the most popular portals used in the industry. Project now uses SharePoint instead of Project Web Access for collaboration. Project Server 2010 also provides integration with Microsoft Exchange 2010 to enable team members to manage and report on tasks directly from Microsoft Outlook. Remember that Project Standard does not include these collaboration features. You must have Project Professional and Project Server to use the enterprise features of Project.

Before You Begin

This appendix assumes you are using Project 2010 with Windows 7, Vista, or XP and are familiar with other Windows-based applications. You can download a free trial of Project 2010 from Microsoft's Web site. Additionally, students and faculty can purchase software at deep discounts from several sources, including www.journeeyed.com. Check your work by reviewing the many screen shots included in the steps or by using the solution files that are available for download from the companion Web site for this text or from your instructor.

HELP

You need to be running Windows 7, Vista, or XP as your operating system to use Project 2010. If you have any technical difficulties, contact Microsoft's Support Services at www.microsoft.com. To complete the hands-on activities in the appendix, you will need to copy a set of files from the companion Web site for this text (www.cengage.com/mis/schwalbe) to your computer. You can also download the files from the author's Web site (www.kathyschwalbe.com) under Book FAQs.

This appendix uses a fictitious information technology project—the Project Tracking Database project—to illustrate how to use the software. The goal of this project is to create a database to keep track of all the projects a company is working on. Each section of the appendix includes hands-on activities for you to perform. When you begin each set of steps, make sure you are using the correct file. Before you begin your work you should have the finance.mpp, resource.mpp, and kickoffmeeting.doc files.

In addition, you will create the following files from scratch as you work through the steps:

- scope.mpp
- time.mpp
- tracking.mpp
- baseline.mpp
- level.mpp

Now that you understand project management concepts and the basic project management terminology, you will learn how to start Project 2010, review the Help facility and a template file, and begin to plan the Project Tracking Database project.

OVERVIEW OF PROJECT 2010

The first step to mastering Project 2010 is to become familiar with the Help facility, major screen elements, views, and filters. This section describes each of these features.

Starting Project 2010 and Using the Help Feature

To start Project 2010:

1. *Open Project 2010.* Click the **Start** button on the taskbar, point to **All Programs** in Windows XP or **Programs** in Windows 7 or Vista, point to or click **Microsoft Office**, and then click **Microsoft Office Project 2010**. Alternatively, a shortcut or icon might be available on the desktop; in this case, double-click the icon to start the software.
2. *Maximize Project 2010.* If the Project 2010 window does not fill the entire screen as shown in Figure A-1, click the **Maximize** button  in the upper-right corner of the window.

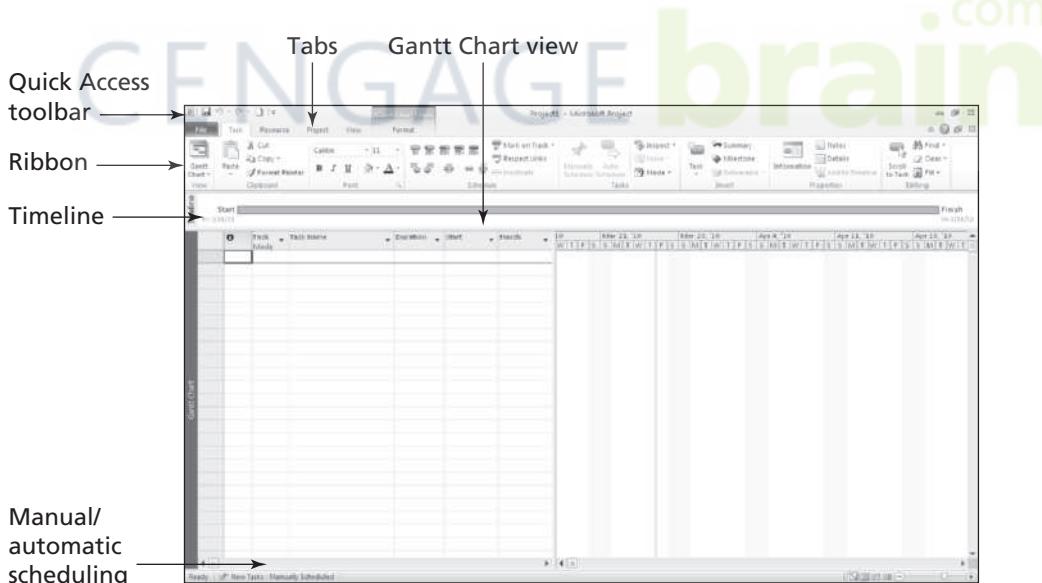
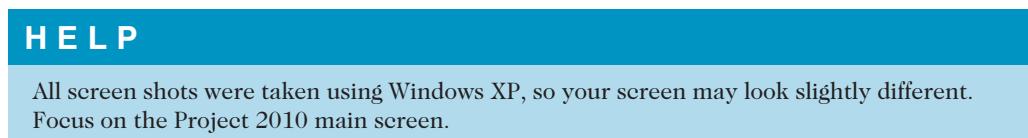


FIGURE A-1 Project 2010 main screen

A.6

Project 2010 is now running and ready to use. Look at some of the elements of the Project 2010 screen. The default view is the Gantt Chart view under the Task tab, which shows tasks and other information in the Entry table as well as a calendar display. You can also use the Quick Access toolbar and tabs as in other Windows applications. Notice the new Timeline and Manual scheduling features on the main screen. You can access other views by clicking the View button on the far left of the Ribbon as shown in Figure A-2.

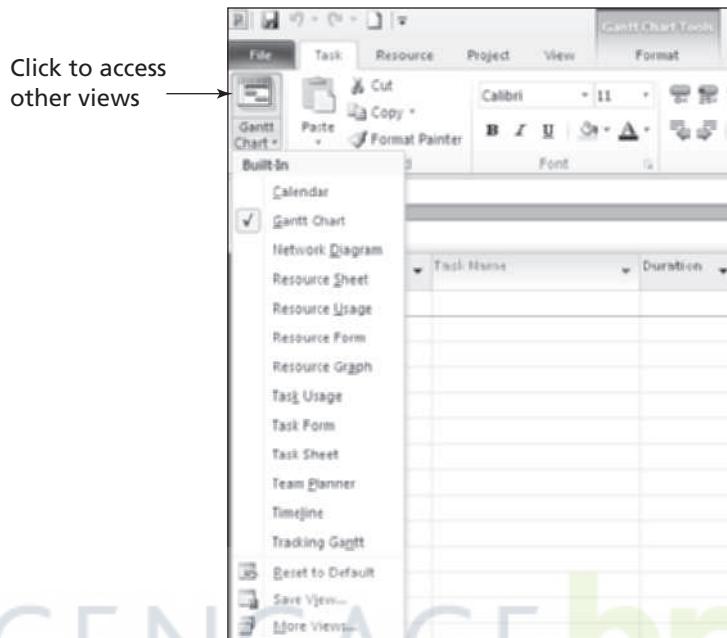


FIGURE A-2 Accessing other views

Notice that when Project 2010 starts, it opens a new file named Project1, as shown in the title bar. If you open a second file, the name will be Project2, and so on, until you save and rename the file.

You can access other information to help you learn how to use Project 2010 under the Help menu. Figure A-3 shows the Help menu options available by clicking Help on the far right side of the Ribbon or by pressing F1.

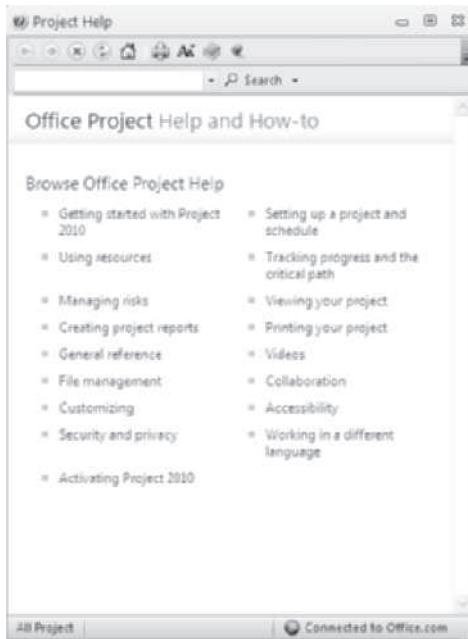


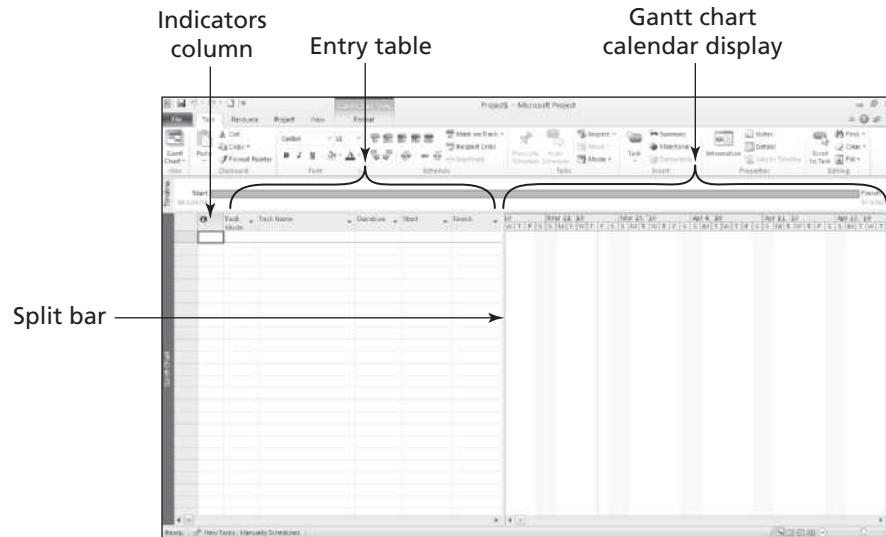
FIGURE A-3 Project 2010 Help menu options

Microsoft realizes that Project 2010 can take some time to learn and provides a number of resources on its Web site. Microsoft's Web site for Project 2010 (www.microsoft.com/project) provides files for users to download, case studies, articles, and other useful materials. Also see the Suggested Readings under Appendix A on the companion Web site for this text.

Main Screen Elements

The Project 2010 default main screen is called the Gantt Chart view. At the top of the main screen, the Ribbon is similar to other *Microsoft Windows 2007* and *2010* programs. Project 2010 does have Ribbon interface, while Project 2007 did not. The order and appearance of buttons on the Ribbon may vary, depending on the features you are using and how the Ribbon is customized.

Figure A-4 shows the main screen elements of Project 2010. On the left side of the screen below the Ribbon is the Entry table. The Gantt chart calendar display appears on the right of the split bar, which separates the Entry table and the Gantt chart. The column to the left of the Task Name column is the Indicators column. The Indicators column displays indicators or symbols related to items associated with each task, such as task notes or hyperlinks to other files.

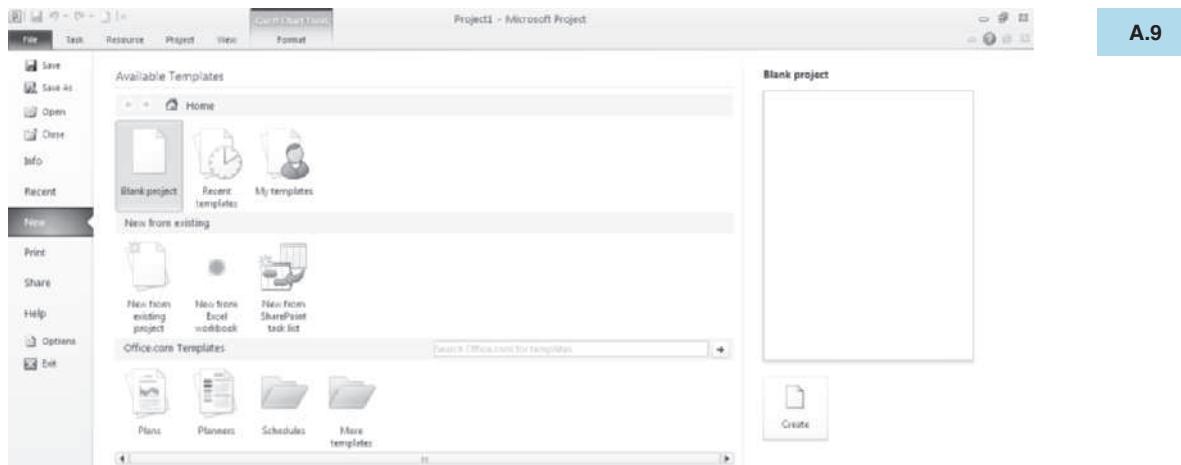
A.8**FIGURE A-4** Project 2010 main screen elements**TIP**

Many features in Project 2010 are similar to ones in other Windows programs. For example, to collapse or expand tasks, click the appropriate symbols to the left of the task name. To access shortcut items, right-click in either the Entry table area or the Gantt chart. Many of the Entry table operations in Project 2010 are very similar to operations in Excel. For example, to adjust a column width, click and drag or double-click between the column heading titles.

If you select another view and want to return to the Gantt Chart view, click the Gantt Chart button on the Ribbon under the Tasks tab or the appropriate button under the Task views section under the View tab. If the Entry table on the left appears to be different, select the Tables button under the Data section from the View tab.

Notice the split bar that separates the Entry table from the Gantt chart. When you move the mouse over the split bar, your cursor changes to the resize pointer. Clicking and dragging the split bar to the right reveals other task information in the Entry table, including the Duration, Start date, Finish date, Predecessors, and Resource Names columns.

Next, you will open a template file to explore more screen elements. Project 2010 comes with several template files, and you can also access templates from Microsoft Office Online or other Web sites. To open template files on your computer, you normally click New under the File tab. A list of available templates displays, as shown in Figure A-5. For the following steps you will open a template file you downloaded from the companion Web site. It will not display under the list of available templates because it is a template from an older version of Project.



A.9

FIGURE A-5 Opening a template file**HELP**

To access template files on your computer, you must do a full or custom install of Project 2010.

To open a template file and adjust Project 2010 screen elements:

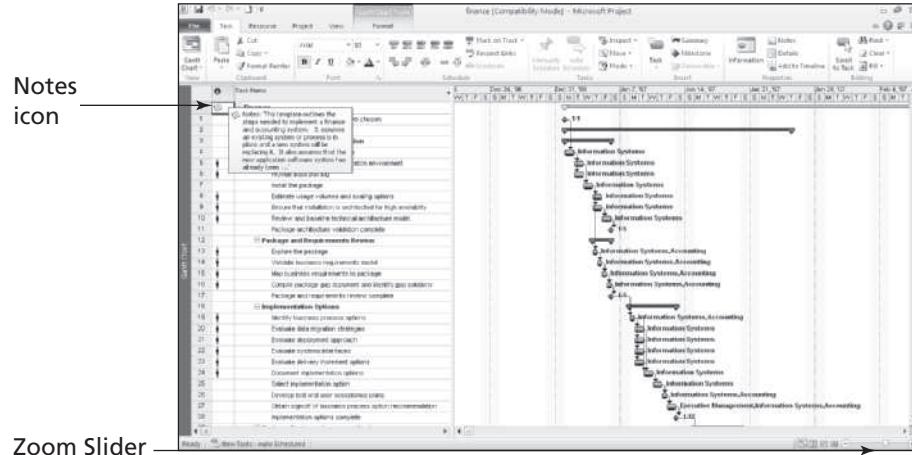
1. *Open a template file.* Click the **Open** button under the File tab, browse to find the file named **finance.mpp** that you copied from the companion Web site, or author's Web site for this text, and then double-click the filename to open the file. This file provides a template for a project to implement a new finance and accounting system in a corporate environment.

TIP

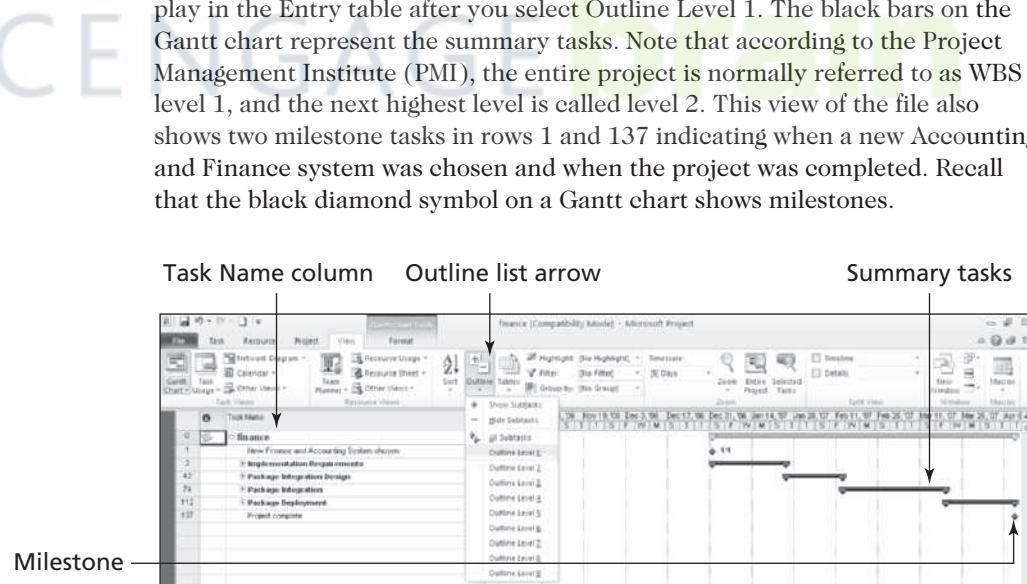
The **finance.mpp** file is identical to the template named “Finance and Accounting System Implementation” that comes with Project 2007.

2. *View the Note.* Move your mouse over the **Notes** icon in the Indicators column and read its contents. It is a good idea to provide a short note describing the purpose of project files. (You'll learn how to add notes in the Communications section of this guide.) Your screen should resemble Figure A-6.

A.10

**FIGURE A-6** The finance.mpp file

3. *Adjust the timescale.* Click the **Zoom Out** icon on the **Zoom Slider bar** on the lower right of your screen twice to adjust the timescale so that you see the entire bar at the top of the Gantt chart. Notice that this project started on January 1, 2007, and ended in early April 2007. The first line in the Entry table displays the file-name, and the bar in the Gantt chart next to that line shows the time line for the entire project.
4. *Select Outline Level 1 to display WBS level 2 tasks.* Under the View tab, click the **Outline** button's list arrow, and then click **Outline Level 1**, as shown in Figure A-7. Notice that only the outline level 1 items or WBS level 2 items display in the Entry table after you select Outline Level 1. The black bars on the Gantt chart represent the summary tasks. Note that according to the Project Management Institute (PMI), the entire project is normally referred to as WBS level 1, and the next highest level is called level 2. This view of the file also shows two milestone tasks in rows 1 and 137 indicating when a new Accounting and Finance system was chosen and when the project was completed. Recall that the black diamond symbol on a Gantt chart shows milestones.

**FIGURE A-7** Viewing summary tasks

5. *Adjust the Task Name column.* Move the split bar to the right, if needed, to reveal the entire Task Name column. Move your cursor over the right-column gridline in the Task Name column heading until you see the resize pointer, and then double-click the **left mouse button** to resize the column width automatically.
6. *Move the split bar to reveal more Entry table columns.* Move the split bar to the right to reveal the Resource Names column. Your screen should resemble Figure A-8.

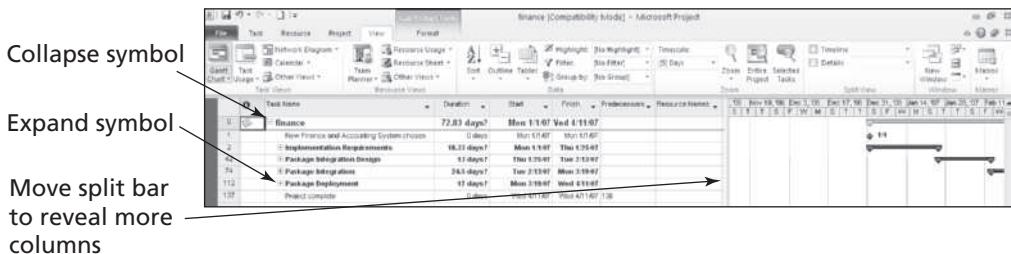


FIGURE A-8 Adjusting screen elements

7. *Expand a task.* Click the **expand symbol** [+] to the left of Task 112, Package Deployment, to see its subtasks. Click the **collapse symbol** [-] to hide its subtasks.

Project 2010 Views

Project 2010 provides many ways to display project information. These displays are called *views*. The views under the View tab include: Gantt Chart, Task Usage, Network Diagram, Calendar, Resource Usage, and Resource Sheet. The Resource Form and Resource Graph views are available under Other Views, and even more views are available under More Views, such as the Tracking Gantt and Leveling Gantt. These different views allow you to examine project information in different ways, which helps you analyze and understand what is happening on your project.

The View tab also provides access to different tables that display information in a variety of ways. Some tables that you can access from the View tab include Schedule, Cost, Tracking, and Earned Value. Some Project 2010 views, such as the Gantt Chart view, present a broad look at the entire project, whereas others, such as the Form views, focus on specific pieces of information about each task. Three main categories of views are available:

- *Graphical:* A chart or graphical representation of data using bars, boxes, lines, and images.
- *Task Sheet or Table:* A spreadsheet-like representation of data in which each task appears as a new row and each piece of information about the task is represented by a column. Different tables are applied to a task sheet to display different kinds of information.
- *Form:* A specific view of information for one task. Forms are used to focus on the details of one task.

Table A-1 describes some of the predesigned views within each category that Project 2010 provides to help you display the project or task information that you need.

A.12

TABLE A-1 Common Project 2010 views

Category of View	View Name	Description of View
Graphical	Gantt Chart	Standard format for displaying project schedule information that lists project tasks and their corresponding start and finish dates in a calendar format. Shows each task as a horizontal bar with the length and position corresponding to the timescale at the top of the Gantt chart.
	Network Diagram	Schematic display of the logical relationships or sequencing of project activities. Presents each task as a box with linking lines between tasks to show sequencing. Critical tasks appear in red.
Task Sheet or Table	Entry Table	Default table view showing columns for Task Name and Duration. By revealing more of the Entry table, you can enter start and end dates, predecessors, and resource names.
	Schedule Table	Displays columns for Task Name, Start, Finish, Late Start, Late Finish, Free Slack, and Total Slack.
	Cost Table	Displays columns for Task Name, Fixed Cost, Fixed Cost Accrual, Total Cost, Baseline, Variance, Actual, and Remaining.
Tracking Table	Tracking Table	Displays columns for Task Name, Actual Start, Actual Finish, % Complete, Physical % Complete, Actual Duration, Remaining Duration, Actual Cost, and Actual Work.
	Earned Value	Displays columns for Task Name, PV, EV, AC, SV, CV, EAC, BAC, and VAC. See the earned value section of this text for descriptions of these acronyms.
Form	Task Form	Displays detailed information about a single task in one window.
	Resource Form	Displays detailed information about a single resource in one window.

Next, you will use the same file (finance.mpp) to access and explore some of the views available in Project 2010.

To access and explore different views:

1. *Show all subtasks.* Click the **Outline** button  on the Ribbon under the View tab, and then click **All Subtasks**. Under Task Name click **Task 0, finance**.

Appendix A

2. Explore the Network Diagram view. Click the Network Diagram button ■ on the Ribbon, and then move the Zoom Slider ▶ ← → all the way to the left to see more of the diagram. Your screen should resemble Figure A-9.

A.13

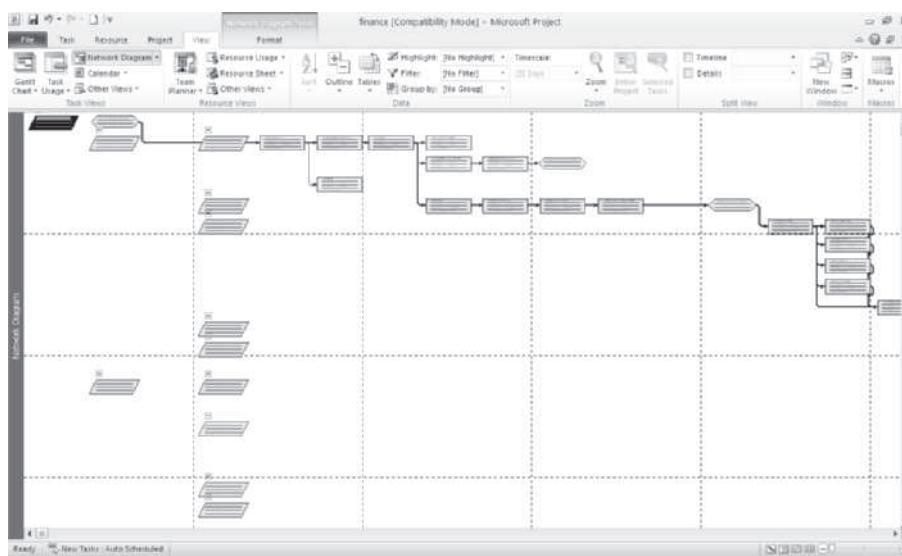


FIGURE A-9 Network Diagram view of finance file

3. Explore the Calendar view. Click the Calendar button ■ on the Ribbon. Your screen should resemble Figure A-10.

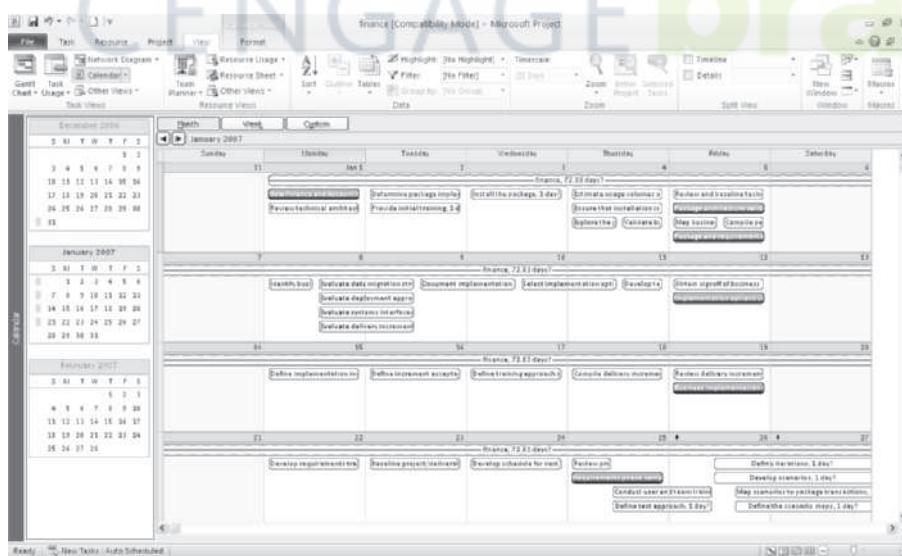


FIGURE A-10 Calendar view of finance file

4. Examine columns in the Entry table. Click the Gantt Chart button  on the Ribbon, and observe the information provided in each column of the Entry table.
5. Examine the Table: Schedule view. Click the Tables button  under the Data section of the View tab, and then click Schedule . Notice that the columns to the left of the Gantt chart now display more detailed schedule information. Also notice that all of the text in the Task Name column is not visible. You can widen the column by moving the mouse to the right of the Task Name column and double-clicking the resize pointer. You can also move the split bar to the right to reveal more columns.
6. Right-click the Select All button to access different table views. Move your mouse to the Select All button to the left of the Task Name column symbol, and then right-click with your mouse. A shortcut menu to different table views displays, as shown in Figure A-11. Experiment with other table views and then return to the Table: Entry view.

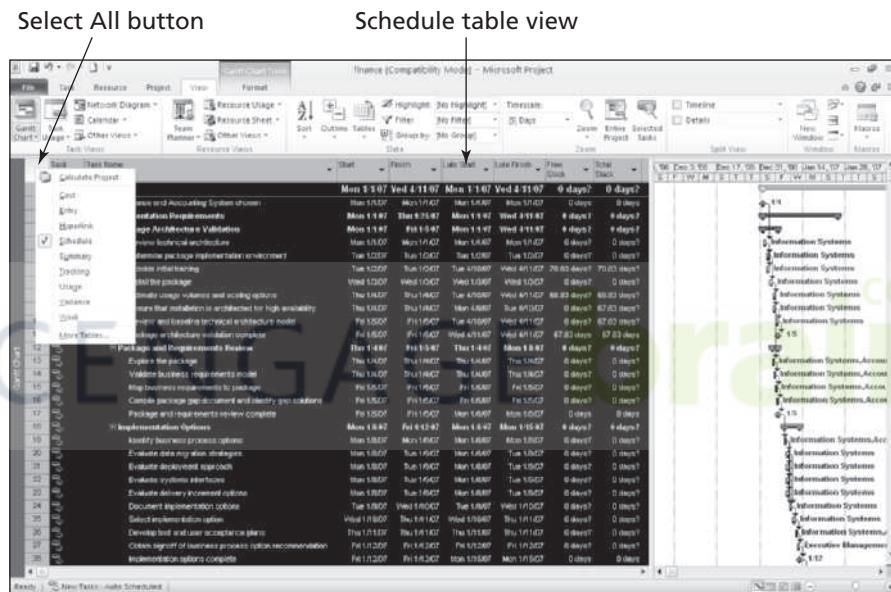


FIGURE A-11 Changing table views

7. Explore the Reports feature. Click the Project tab, and then click the Reports button. The Reports dialog box displays, as shown in Figure A-12.



FIGURE A-12 Reports dialog box

8. View the *Project Summary* report. Double-click **Overview** from the Reports dialog box, and then double-click **Project Summary** in the Overview Reports dialog box. Notice that Project 2010 switches to the Backstage (File tab) to make it easy for you to print or share your report, as shown in Figure A-13.

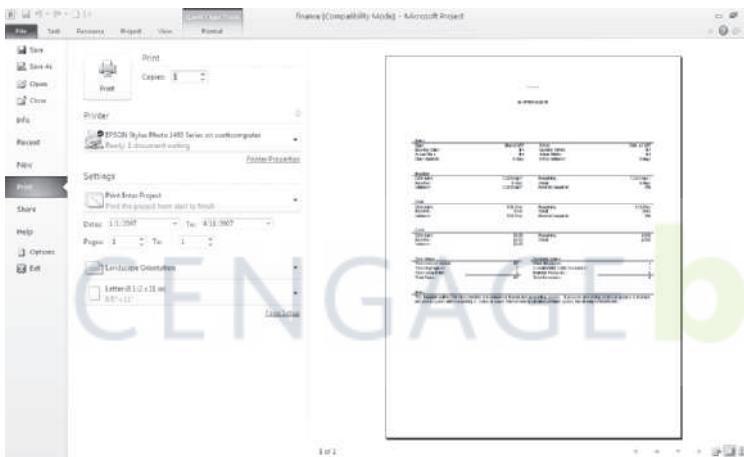


FIGURE A-13 Previewing a report in the Backstage

9. Examine reports and return to the Task tab. Move the mouse to the right side of the screen to examine the report more closely. Notice that the insertion point now resembles a magnifying glass. Click inside the report to zoom in or zoom out. Click the **Project** tab again, and then experiment with viewing other reports. You will use several reports and other views later. Click the **Task** tab when you are finished.

Project 2010 Filters

Project 2010 uses an underlying relational database to filter, sort, store, and display information. Filtering project information is very useful. For example, if a project includes hundreds of tasks, you might want to view only summary or milestone tasks to get an

overview of the project. To get this type of overview of a project, select the Milestones or Summary Tasks filter from the Filter list. If you are concerned about the schedule, you can select a filter that shows only tasks on the critical path. Other filters include Completed Tasks, Late/Overbudget Tasks, and Date Range, which displays tasks based on dates you provide. As shown earlier, you can also click the Show button on the toolbar to display different levels in the WBS quickly. For example, Outline Level 1 shows the highest-level items in the WBS, Outline Level 2 shows the next level of detail in the WBS, and so on.

To explore Project 2010 filters:

1. *Apply a filter to see only milestone tasks.* From the Table: Entry view in the finance.mpp file, click the **View** tab, and then click the **Filter list arrow** , as shown in Figure A-14.

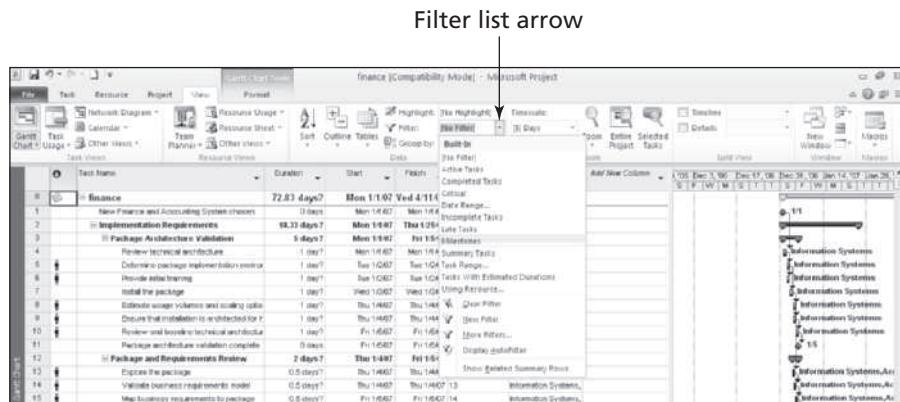


FIGURE A-14 Using a filter

2. *Filter to show specific tasks.* Click **Milestones** in the list of filters, and move the split bar to the left to see all the milestones on the Gantt chart. Your screen should resemble Figure A-15. The black diamond symbol represents a milestone, a significant event on a project.

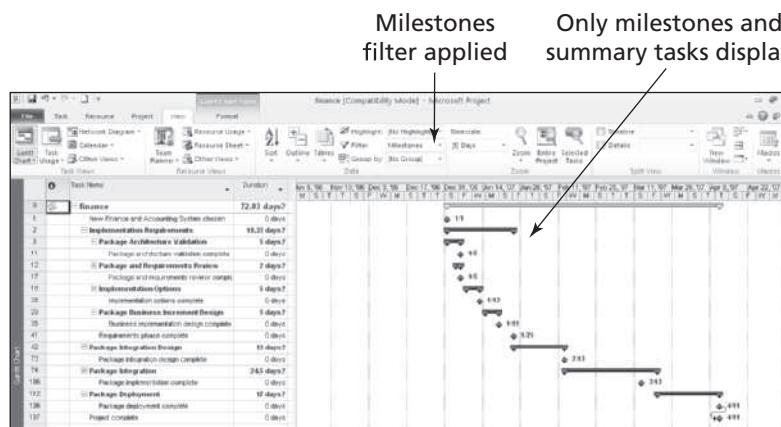


FIGURE A-15 Milestone tasks filter for Project 2010 finance file

3. *Show summary tasks.* Click the **Filter** list arrow, scroll down until you see **Summary Tasks**, and then click **Summary Tasks**. Now only the summary tasks appear in the WBS. Experiment with other outline levels and filters.
4. *Close the file.* When you are finished reviewing the finance.mpp file, click **Close** from the File menu or click the **Close** button . A dialog box appears asking if you want to save changes. Click **No**.
5. *Exit Project 2010.* Select **Exit** from the File menu or click the **Close** button for Project 2010.

Now that you are familiar with the Project 2010 main screen elements, views, and filters, you will learn how to use Project 2010 to assist in project scope management by creating a new project file, developing a WBS, and setting a baseline.

PROJECT SCOPE MANAGEMENT

Project scope management involves defining the work to perform to carry out the project. To use Project 2010, you must first determine the scope of the project. To begin determining the project's scope, create a new file with the project name and start date. Develop a list of tasks that need to be done to carry out the project. This list of tasks becomes the work breakdown structure (WBS). If you intend to track actual project information against the initial plan, you must set a baseline. In this section, you will learn how to create a new project file, develop a WBS, and set a baseline to help plan and manage the Project Tracking Database project. To start, you will enter the scope-related information.

TIP

In this section, you will go through several steps to create the scope.mpp Project 2010 file. If you want to download the completed file to check your work or continue to the next section, a copy of scope.mpp is available on the companion Web site for this text, from the author's Web site, or from your instructor. Try to complete an entire section of this appendix (project scope management, project time management, and so on) in one sitting to create the complete file. Also, be sure to save the scope.mpp file you create in a different folder than the one you download, and then compare the two files.

Creating a New Project File

To create a new project file:

1. *Create a blank project.* Open Project 2010. A blank project file automatically opens when you start Project 2010. The default filenames are Project1, Project2, and so on. If Project 2010 is already open and you want to open a new file, click the **File** tab, click **New**, and select **Blank Project**.
2. *Open the Project Information dialog box.* Click the **Project** tab, and then click **Project Information** to display the Project Information dialog box, as shown in Figure A-16. The Project Information dialog box enables you to set dates for the project, select the calendar to use, and view project statistics. The project start

A.18

date will default to today's date. Note that in Figure A-16 the file was created on 3/31/10 and a Start date of 2/1/11 was entered. (See the following Help box for information about changing date formats).

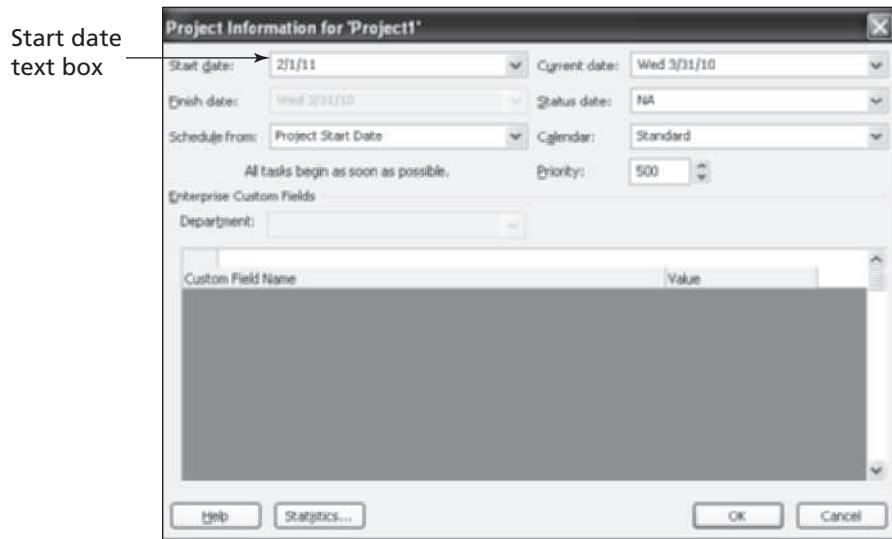


FIGURE A-16 Project Information dialog box

3. Enter the project start date. In the Start date text box, enter **2/1/11**. Setting your project start date to 2/1/11 will ensure that your work matches the results that appear in this appendix. Leave the Finish date, Current date, and other information at the default settings. Click **OK**.

HELP

This appendix uses American date formats. For example, 2/1/11 represents February 1, 2011. Be sure to enter dates in this format for these steps. However, you can change the date format by selecting Options from the File tab. Click the date format you want to use in the Date Format box under the General settings. You can also customize the Ribbon, change default currencies in the display, and so on under Project Options.

4. Access advanced project properties. Click the **File** tab, and then click **Info**. Click **Project Information** on the right side of the screen to access Advanced Properties, as shown in Figure A-17.

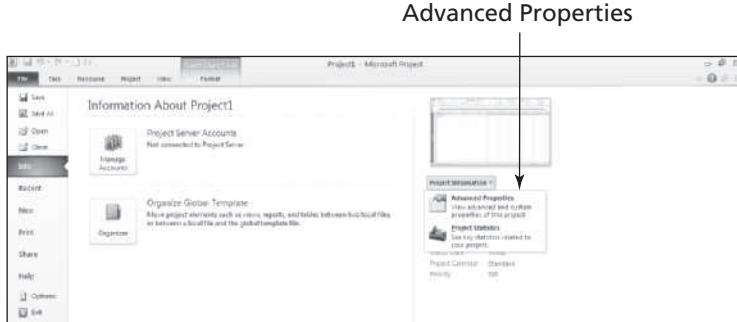


FIGURE A-17 Accessing advanced project properties

5. *Enter advanced project information.* Type Project Tracking Database in the Title text box, type Terry Dunlay in the Author text box, as shown in Figure A-18, and then click OK. You may have some default information entered in the Project Properties dialog box, such as your company's name. Click the Task tab so you can see the Entry table and Gantt Chart view. Keep this file open for the next set of steps.



FIGURE A-18 Project Properties dialog box

A.20

Developing a Work Breakdown Structure

Before using Project 2010, you must develop a work breakdown structure (WBS) for your project. Developing a good WBS takes time, but it will make entering tasks into the Entry table easier if you develop the WBS first. It is also a good idea to establish milestones before entering tasks in Project 2010. You will use the information in Table A-2 to enter tasks for the Project Tracking Database project. Be aware that this example is much shorter and simpler than most WBSs.

To develop a WBS and enter milestones for the Project Tracking Database project:

1. *Enter task names.* Enter the 20 tasks in Table A-2 into the Task Name column in the order shown. Do not worry about durations or any other information at this time. Type the name of each task into the Task Name column of the Entry table, beginning with the first row. Press **Enter** or the **down arrow** key on your keyboard to move to the next row.

HELP

If you accidentally skip a task, highlight the task row, right-click, and select Insert Task. To edit a task entry, click the text for that task, and either type over the old text or edit the existing text.

TABLE A-2 Project Tracking Database tasks

Order	Task Name
1	Initiating
2	Kickoff meeting
3	Develop project charter
4	Charter signed
5	Planning
6	Develop project plans
7	Review project plans
8	Project plans approved
9	Executing
10	Analysis
11	Design
12	Implementation
13	System implemented

(continued on next page)

TABLE A-2 Project Tracking Database tasks (*continued*)

A.21

Order	Task Name
14	Controlling
15	Report performance
16	Control changes
17	Closing
18	Prepare final project report
19	Present final project
20	Project completed

TIP

Entering tasks into Project 2010 and editing the information is similar to entering and editing data in an Excel spreadsheet. You can also easily copy and paste text from Excel or Word into Project, such as the list of tasks.

2. *Move the split bar to reveal more columns.* If necessary, move the split bar to the right to reveal the entire Task Name and Duration columns.
3. *Adjust the Task Name column width as needed.* To make all the text display in the Task Name column, move the mouse over the right-column gridline in the Task Name column heading until you see the resize pointer, and then click the left mouse button and drag the line to the right to make the column wider, or double-click to adjust the column width automatically.

This WBS separates tasks according to the project management process groups of initiating, planning, executing, controlling, and closing. These tasks will be the level 2 items in the WBS for this project. Remember that the whole project is considered level 1. It is a good idea to include all of these process groups because there are important tasks that must be done under each of them. Recall that the WBS should include *all* of the work required for the project. In the Project Tracking Database WBS, the tasks will be purposefully left at a high WBS level (level 3). You will create these levels, or the WBS hierarchy, next when you create summary tasks. For a real project, you would usually break the WBS into even more levels to provide more details to describe all the work involved in the project. For example, analysis tasks for a database project might be broken down further to include preparing entity relationship diagrams for the database and developing guidelines for the user interface. Design tasks might be broken down to include preparing prototypes, incorporating user feedback, entering data, and testing the database. Implementation tasks might include more levels, such as installing new hardware or software, training the users, fully documenting the system, and so on.

A.22

Creating Summary Tasks

After entering the WBS tasks listed in Table A-2 into the Entry table, the next step is to show the WBS levels by creating summary tasks. The summary tasks in this example are Tasks 1 (initiating), 5 (planning), 9 (executing), 14 (controlling), and 17 (closing). You create summary tasks by highlighting and indenting their respective subtasks.

To create the summary tasks:

1. *Select lower level or subtasks.* Highlight Tasks 2 through 4 by clicking the cell for Task 2 and dragging the mouse through the cells to Task 4.
2. *Indent subtasks.* Click the **Indent task** button  on the Ribbon under the Schedule group of the Task tab (or press Alt + Shift + right arrow) so your screen resembles Figure A-19. After the subtasks (Tasks 2 through 4) are indented, notice that Task 1 automatically becomes boldface, which indicates that it is a summary task. A collapse symbol appears to the left of the new summary task name. Clicking the **collapse symbol**  will collapse the summary task and hide the subtasks beneath it. When subtasks are hidden, an **expand symbol**  appears to the left of the summary task name. Clicking the expand symbol will expand the summary task. Also, notice that the symbol for the summary task on the Gantt chart appears as a black line with arrows indicating the start and end dates.

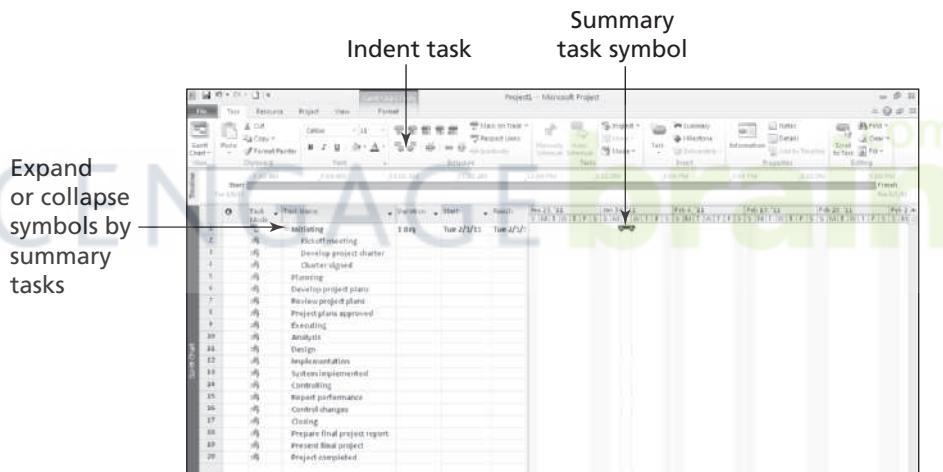


FIGURE A-19 Indenting tasks to create the WBS hierarchy

3. *Create other summary tasks and subtasks.* Create subtasks and summary tasks for Tasks 5, 9, 14, and 17 by following the same steps. Indent Tasks 6 through 8 to make Task 5 a summary task. Indent Tasks 10 through 13 to make Task 9 a summary task. Indent Tasks 15 through 16 to make Task 14 a summary task. Indent Tasks 18 through 20 to make Task 17 a summary task. Widen the Task Name column to see all of your text, as needed.

TIP

A.23

To change a task from a summary task to a subtask or to change its level up one in the WBS, you can “outdent” the task instead of indenting it. To outdent the task, click the cell of the task or tasks you want to change, and then click the **Outdent Task** button  on the Ribbon (the button just to the left of the Indent Task button). You can also press Alt + Shift + Right Arrow to indent tasks and Alt Shift Left Arrow to outdent tasks. Remember, the tasks in Project 2010 should be entered in an appropriate WBS format with several levels in the hierarchy.

Numbering Tasks

Depending on how Project 2010 is set up on your computer, you may or may not see numbers associated with tasks as you enter and indent them.

To display automatic numbering of tasks using the standard tabular numbering system for a WBS:

- Show outline numbers.* Click the **Format** tab, and then click the **Outline Number** checkbox under the Show/Hide group. Project 2010 adds the appropriate WBS numbering to the task names.
- Show project summary task.* Click the **Project Summary** checkbox just below the Outline Number checkbox. Notice that a new task has been added under row 0.
- Adjust the file.* Widen the Task Name column and move the split bar so only that column displays. Your file should resemble Figure A-20.

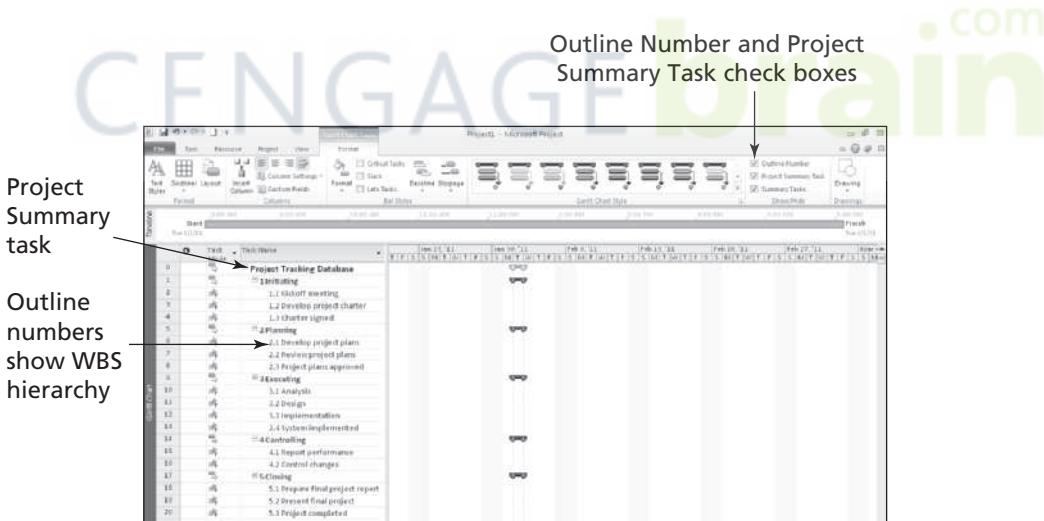


FIGURE A-20 Adding Outline Numbers and Project Summary Task

Saving Project Files with or without a Baseline

An important part of project management is tracking performance against a baseline, or approved plan. Project 2010 does not prompt you to save a file with or without a baseline each time you save it, as some previous versions did. The default is to save without a baseline. It is important to wait until you are ready to save your file with a baseline because Project 2010 will show changes against a baseline. Because you are still developing your project file for the Project Tracking Database project, you want to save the file without a baseline. Later in this appendix, you will save the file with a baseline by selecting Tools, Tracking, and then Set Baseline. You will then enter actual information to compare planned and actual performance data.

To save a file without a baseline:

1. *Save your file.* Click the **File** tab and then click **Save**, or click the **Save** button  on the Quick Access toolbar.
2. *Enter a filename.* In the Save As dialog box, type **scope** in the File name text box. Browse to the location in which you want to save the file, and then click **Save**. Your Project 2010 file should look like Figure A-20, but with the file name showing as scope instead of Project1.

HELP

If you want to download the Project 2010 file scope.mpp to check your work or continue to the next section, a copy is available on the companion Web site for this text, the author's Web site, and from your instructor. If you downloaded the scope.mpp file that comes with this text, you can save your file with a different name or in a different location to avoid overwriting that file. Keep this in mind for other files you save as well.

Now that you have finished entering all 20 tasks, created the summary tasks and subtasks, set the options to show the standard WBS tabular numbering system, and saved your file, you will learn how to use the Project 2010 time management features.

PROJECT TIME MANAGEMENT

Many people use Project 2010 for its time management features. The first step in using these features, after inputting the WBS for the project, is to enter durations for tasks or specific dates when tasks will occur. Inserting durations or specific dates will automatically update the Gantt chart. To use Project 2010 to adjust schedules automatically and to do critical path analysis, you must also enter task dependencies. After entering durations and task dependencies, you can view the network diagram and critical path information. This section describes how to use each of these time management features. It also explains the difference between the new manual and automatic scheduling features of Project 2010.

Manual and Automatic Scheduling

If you have used earlier versions of Project, you probably noticed that when you entered a task, it was automatically assigned a duration of one day, and Start and Finish dates were

also automatically entered. This is still the case in Project 2010 if you use automatic scheduling for a task. If you use manual scheduling, no durations or dates are automatically entered. The other big change with manual scheduling is that summary task durations are not automatically calculated based on their subtasks when they are set up as manually scheduled tasks. Figure A-21 illustrates these differences. Notice that the Manual subtask 1 had no information entered for its duration, start, or finish dates. Also note that the duration for Manual summary task 1 is not dependent on the durations of its subtasks. For the Automatic summary task, its duration is dependent on its summary tasks, and information is entered for all of the durations, start, and end dates. You can switch between automatic and manual scheduling for tasks in the same file, as desired, by changing the Task Mode.

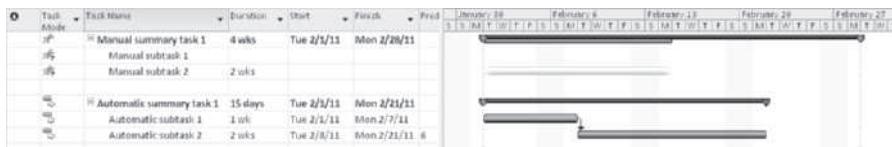


FIGURE A-21 Manual versus automatic scheduling

When you move your mouse over the Task Mode column (shown in the far left in Figure A-21) Project 2010 displays the following information:

- A task can be Manually Scheduled or Automatically Scheduled.
- Manually Scheduled tasks have user-defined Start, Finish, and Duration values. Project will never change their dates, but may warn you if there are potential issues with the entered values.
- Automatically Scheduled tasks have Start, Finish, and Duration values calculated by Project based on dependencies, constraints, calendars, and other factors.

Project Help provides the following example of using both manual and automatic scheduling. You set up a preliminary project plan that's still in the proposal stage. You have a vague idea of major milestone dates but not much detail on other dates in various phases of the project. You build tasks and milestones using the Manually Scheduled task mode. The proposal is accepted and the tasks and deliverable dates become more defined. You continue to manually schedule those tasks and dates for a while, but as certain phases become well-defined, you decide to switch the tasks in those phases to the Automatically Scheduled task mode. By letting Project 2010 handle the complexities of scheduling, you can focus your attention on those phases that are still under development.

Entering Task Durations

When you enter a task, Project 2010 assumes it is manually scheduled, so no duration is automatically entered. If you switch to the automatic scheduling mode, Project 2010 assigns those tasks a default duration of one day, followed by a question mark. To change the default duration, type a task's estimated duration in the Duration column. If you are unsure of an estimate and want to review it again later, enter a question mark after it. For example, you could enter 5d? for a task with an estimated duration of five days that you want to review later. You can then use the Tasks With Estimated Durations filter to see quickly the tasks for which you need to review duration estimates.

A.26

To indicate the length of a task's duration, you must type both a number and an appropriate duration symbol. If you type only a number, Project 2010 automatically enters days as the duration unit. Duration unit symbols include:

- d = days (default)
- w = weeks
- m = minutes
- h = hours
- mo or mon = months
- ed = elapsed days
- ew = elapsed weeks

For example, to enter one week for a task duration, type 1w in the Duration column. (You can also type wk, wks, week, or weeks, instead of just w.) To enter two days for a task duration, type 2d in the Duration column. The default unit is days, so if you enter 2 for the duration, it will be entered as 2 days. You can also enter elapsed times in the Duration column. For example, 2ed means two elapsed days, and 2ew means two elapsed weeks. You would use an elapsed duration for a task like "Allow paint to dry." The paint will dry in exactly the same amount of time regardless of whether it is a workday, a weekend, or a holiday.

TIP

If the Duration column is not visible, drag the split bar to the right until the Duration column is in view.

Entering time estimates or durations might seem like a straightforward process. However, you must follow a few important procedures:

- To mark a task as a milestone, enter 0 for the duration. You can also mark tasks that have a non-zero duration as milestones by checking the "Mark task as milestone" option in the Task Information dialog box on the Advanced tab. You simply double-click a task to access this dialog box. The milestone symbol for those tasks will appear at their start date.
- You can enter the exact start and finish dates for activities instead of entering durations in the automatic scheduling mode. To enter start and finish dates, move the split bar to the right to reveal the Start and Finish columns. You normally only enter start and finish dates in this mode when those dates are certain.
- If you want task dates to adjust according to any other task dates, do not enter exact start and finish dates. Instead, enter durations and then establish dependencies to related tasks.
- To enter recurring tasks, such as weekly meetings, select Recurring Task from the Task button under the Task tab, Insert group. Enter the task name, the duration, and when the task occurs. Project 2010 will automatically insert appropriate subtasks based on the length of the project and the number of tasks required for the recurring task.
- Project 2010 uses a default calendar with standard workdays and hours. Remember to change the default calendar if needed, as described later in this appendix.

Next, you will set task durations in the Project Tracking Database file (scope.mpp) that you created and saved in the previous section. If you did not create the file named scope.mpp, you can download it from the companion Web site for this text. You will create a new recurring task and enter its duration, and then you will enter other task durations. First, create a new recurring task called Status Reports above Task 15, Report performance.

To create a new recurring task:

- Insert a recurring task above Task 15, Report performance.* Open scope.mpp, if necessary, and then click **Report performance** (Task 15) in the Task Name column to select that task. Click the **Tasks** tab, if needed, and click the **Tasks** button drop-down box under Insert group, and then click **Recurring Task**. The Recurring Task Information dialog box opens.
- Enter task and duration information for the recurring task.* Type **Status Reports** as the task title in the Task Name text box. Type **1h** in the Duration text box. Select the **Weekly** radio button under Recurrence pattern. Make sure that **1** is entered in the **Recur every** list box. Select the **Wednesday** check box. In the Range of recurrence section, type **2/1/11** in the Start text box, click the **End by** radio button, and then type **6/15/11** in the End by text box. Click the **End by** list arrow to see the calendar, as shown in Figure A-22. You can use the calendar to enter the Start and End by dates. The new recurring task will appear above Task 15, Report performance, when you are finished.

TIP

You can also enter a number of occurrences instead of an End by Date for a recurring task. You might need to adjust the End by date after you enter all of your task durations and dependencies. Remember, the date on your computer determines the date listed as Today in the calendar.

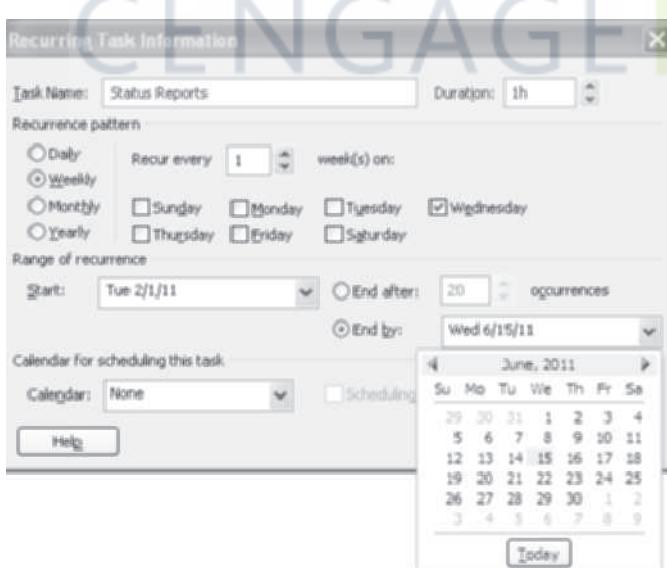


FIGURE A-22 Recurring Task Information dialog box

3. View the new summary task and its subtasks. Click **OK**. Project 2010 inserts a new Status Reports subtask in the Task Name column. Expand the new sub-task by clicking the **expand symbol** [+] to the left of Status Reports. To collapse the recurring task, click the **collapse symbol** [-].
4. Adjust the columns shown and timescale. Move the split bar so that the entire Finish column displays. Click the **Zoom Out** button [–] (minus sign on the Zoom Slider in the lower right of your screen) three times (or as many as needed) to display the entire Gantt chart on your screen. Notice that the recurring task appears on the appropriate dates on the Gantt chart, as shown in Figure A-23.

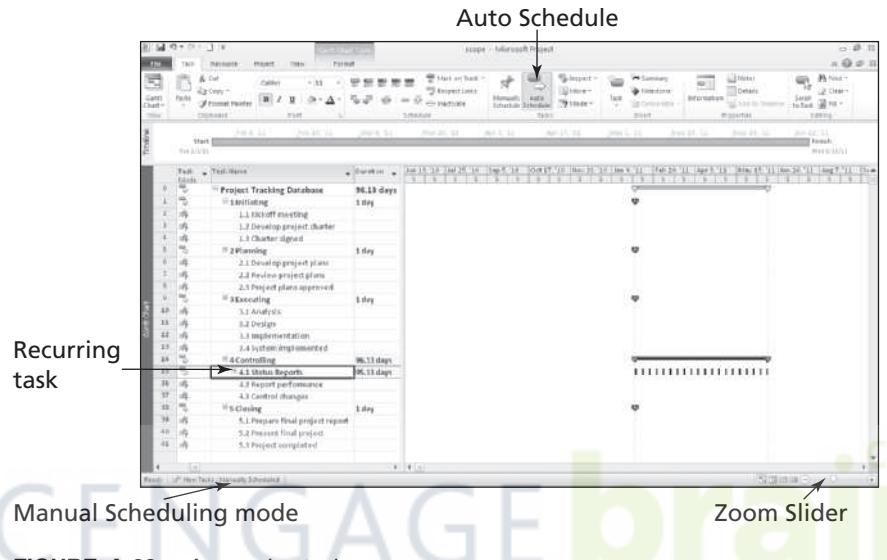


FIGURE A-23 A recurring task

Use the information in Table A-3 to enter durations for the other tasks for the Project Tracking Database project using automatic scheduling. The Project 2010 row number is shown to the left of each task name in the table. Remember, you already entered a duration for the recurring task. Also, remember that you should *not* enter durations for summary tasks. When entering tasks in automatic scheduling mode, durations for summary tasks are automatically calculated to match the durations and dependencies of subtasks, as described further in the next section, Establishing Task Dependencies.

TABLE A-3 Durations for Project Tracking Database tasks

A.29

Task Number/Row	Task Name	Duration
2	Kickoff meeting	2h
3	Develop project charter	10d
4	Charter signed	0
6	Develop project plans	3w
7	Review project plans	4mo
8	Project plans approved	0
10	Analysis	1mo
11	Design	2mo
12	Implementation	1mo
13	System implemented	0
36	Report performance	6mo
37	Control changes	6mo
39	Prepare final project report	2w
40	Present final project	1w
41	Project completed	0

To enter task durations for the other tasks:

1. Turn on automatic scheduling and enter the duration for Task 2. Click row 2 and drag down through row 41 to select all of those tasks. Click the **Auto Schedule** button on the Ribbon under the Task group. Click the **Duration** column for row 2, Kickoff meeting, type **2h**, and then press **Enter**.

TIP

You can also change the scheduling mode for individual tasks by changing that icon in the Indicator column. For this file, we want all of the tasks to be automatically scheduled. If you know that at the start, you can click the icon on the lower left of the screen to make all new tasks automatically scheduled.

A.30

2. Enter the duration for Task 3. In the Duration column for row 3, Develop project charter, type **10d**, and then press **Enter**. You can also just type 10, since d or days is the default duration.
3. Enter remaining task durations. Continue to enter the durations using the information in Table A-3. Be careful not to make entries in the wrong row. Remember that the summary tasks are automatically entered, as is the recurring task.
4. Save your file and name it. Click the **File** tab, and then click **Save As**. Enter **time** as the filename, and then save the file to the desired location on your computer or network. Your file should resemble Figure A-24. Remember that you can use the Zoom Slider to adjust the timescale as needed. Notice that all of the tasks still begin on February 1. This will change in the next section when we add task dependencies. Keep this file open for the next set of steps.

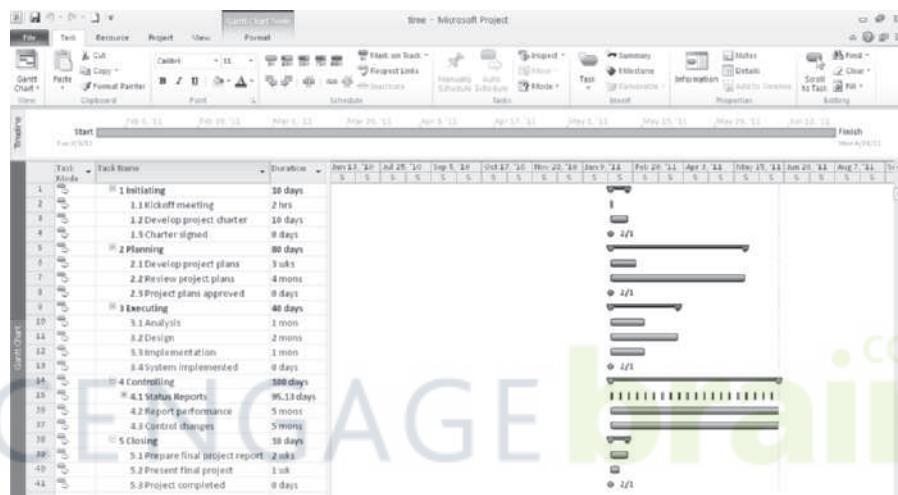


FIGURE A-24 Time file with durations entered

Establishing Task Dependencies

To use Project 2010 to adjust schedules automatically and to do critical path analysis, you *must* determine the dependencies or relationships among tasks. Project 2010 provides three methods for creating task dependencies: using the Link Tasks button, using the Predecessors column of the Entry table or the Predecessors tab in the Task Information dialog box, or clicking and dragging the Gantt chart symbols for tasks with dependencies.

To create dependencies using the Link Tasks button , highlight tasks that are related and then click the Link Tasks button on the toolbar. For example, to create a finish-to-start dependency between Task 1 and Task 2, click any cell in row 1, drag down to row 2, and then click the Link Tasks button. The default type of link is finish-to-start. In the Project Tracking Database example, all the tasks use this default relationship. You will learn about other types of dependencies later in this appendix.

TIP

Selecting tasks is similar to selecting cells in Excel. To select adjacent tasks, click and drag the mouse. You can also click the first task, hold down the Shift key, and then click the last task. To select nonadjacent tasks, hold down the Control (Ctrl) key as you click tasks in order of their dependencies.

When you use the Predecessors column of the Entry table to create dependencies, you must manually enter the information. To create dependencies manually, type the task row number of the preceding task in the Predecessors column of the Entry table. For example, Task 3 in Table A-3 has Task 2 as a predecessor, which can be entered in the Predecessors column, meaning that Task 3 cannot start until Task 2 is finished. To see the Predecessors column of the Entry table, move the split bar to the right. You can also double-click the task, click the Predecessors tab in the Task Information dialog box, and enter the predecessors there. (This is more work than just typing it in the Predecessor column.)

You can also create task dependencies by clicking the Gantt chart symbol for a task and then dragging to the Gantt chart symbol for a task that succeeds it. For example, you could click the Milestone symbol • for Task 4, hold down the left mouse button, and drag to the Task Bar symbol for Task 6 to create a dependency, as shown in the Gantt chart in Figure A-25. After entering a dependency, it shows up in the predecessors column and as a line with an arrow connecting the dependent tasks on the Gantt chart.

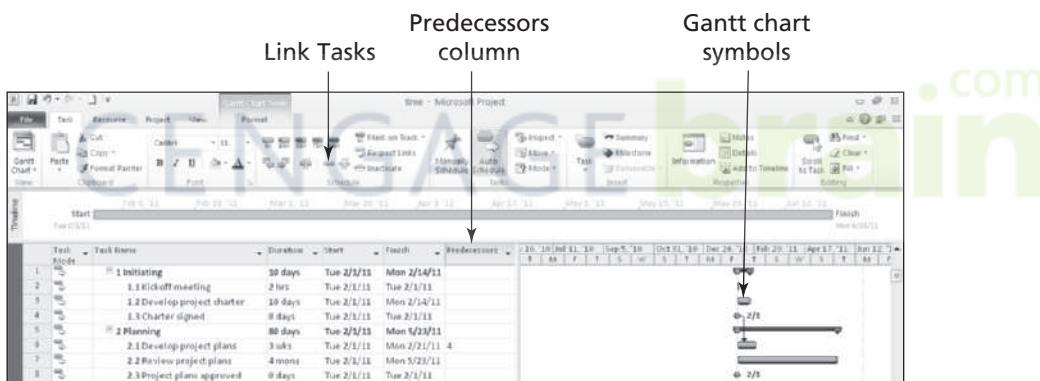
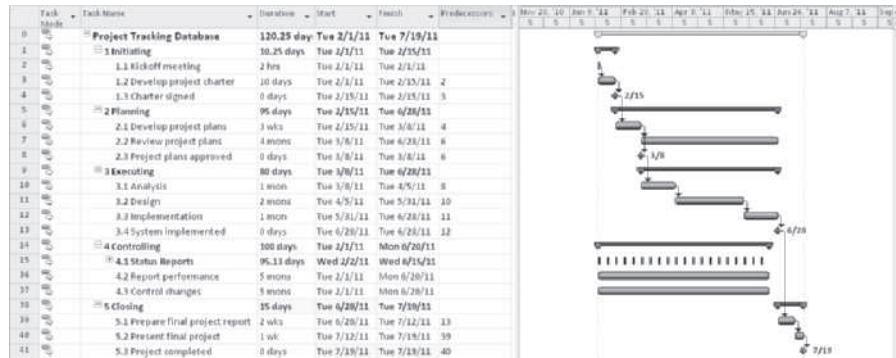


FIGURE A-25 Creating task dependencies

Next, you will use information from Figure A-26 to enter the predecessors for tasks as indicated. You will create some dependencies by manually typing the predecessors in the Predecessors column, some by using the Link Tasks button, some by using the Gantt chart symbols, and the remaining dependencies by using whichever method you prefer.

A.32

**FIGURE A-26** Project Tracking Database file with durations and dependencies entered

To link tasks or establish dependencies for the Project Tracking Database project:

1. *Display the Predecessors column in the Entry table.* Move the split bar to the right to reveal the full Predecessors column in the time.mpp file. Widen the Task Name or other columns, if needed.
2. *Highlight the cell where you want to enter a predecessor, and then type the task number for the preceding task.* Click the Predecessors cell for Task 3, type 2, and press **Enter**. Notice that as you enter task dependencies, the Gantt chart changes to reflect the new schedule.
3. *Enter predecessors for Task 4.* Click the Predecessors cell for Task 4, type 3, and press **Enter**.
4. *Establish dependencies using the Link Tasks button.* To link Tasks 10 through 13, click the task name for Task 10, **Analysis**, and drag down through Task 13, **System Implemented**. Then, click the **Link Tasks** button on the Ribbon under the Schedule group of the Task tab.
5. *Create a dependency using Gantt chart symbols.* Click the Milestone symbol for Task 4 on the Gantt chart, hold down the left mouse button, and drag to the Task Bar symbol for Task 6.
6. *Enter remaining dependencies.* Link the other tasks by either manually entering the predecessors into the Predecessors column, by using the Link Tasks button, or by clicking and dragging the Gantt chart symbols. Note the visual change highlighting feature that displays as you enter dependencies. You can view the dependencies in Figure A-26. For example, Task 8 has Task 6 as a predecessor, Task 10 has Task 8 as a predecessor, Task 39 has 13, Task 40 has 39, and Task 41 has 40 as a predecessor. If you have entered all data correctly, the project should end on 7/19/11, or July 19, 2011.
7. *Adjust screen elements.* Move the position of the timescale and adjust columns as needed so your screen resembles Figure A-26. Double-check your screen to make sure you entered the dependencies correctly.
8. *Preview and save your file.* Click the File tab, and then select **Print** to preview your file in the Backstage, as shown in Figure A-27. If you need to make changes to the file before printing, click the Task tab to make changes, and then save your file again by clicking the **Save** button on the Quick Access

toolbar. If you desire, print your file by clicking the **Print** button in the Backstage (or File tab). Keep the file open for the next set of steps.

File tab shows the Backstage view of files

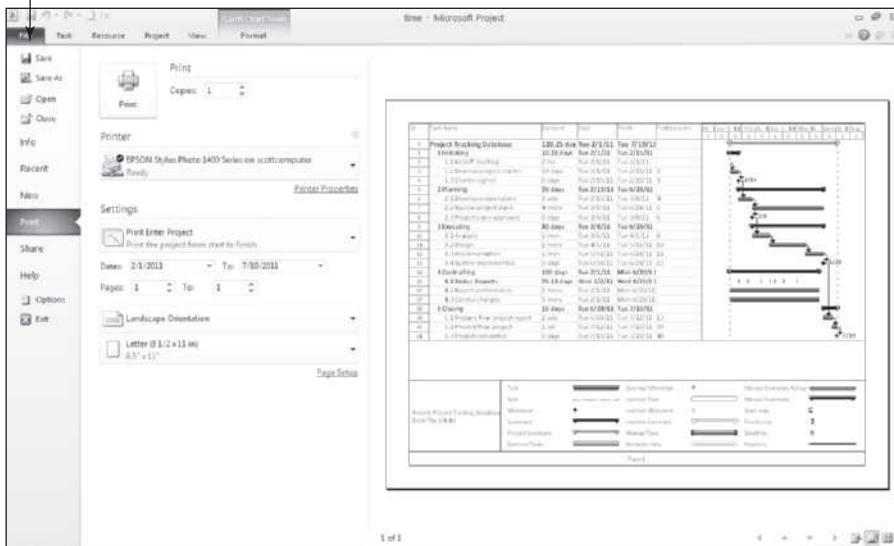


FIGURE A-27 Project Tracking Database file in the Backstage

Changing Task Dependency Types and Adding Lead or Lag Time

A task dependency or relationship describes how a task is related to the start or finish of another task. Project 2010 allows for four task dependencies: finish-to-start (FS), start-to-start (SS), finish-to-finish (FF), and start-to-finish (SF). By using these dependencies effectively, you can modify the critical path and shorten your project schedule. The most common type of dependency is finish-to-start (FS). All of the dependencies in the Project Tracking Database example are FS dependencies. However, sometimes you need to establish other types of dependencies. This section describes how to change task dependency types. It also explains how to add lead or lag times between tasks. You will shorten the duration of the Project Tracking Database project by adding lead time between some tasks.

To change a dependency type, open the Task Information dialog box for that task by double-clicking the task name. On the Predecessors tab of the Task Information dialog box, select a new dependency type from the Type column list arrow.

The Predecessors tab also allows you to add lead or lag time to a dependency. You can enter both lead and lag time using the Lag column on the Predecessors tab. Lead time reflects an overlap between tasks that have a dependency. For example, if Task B can start when its predecessor, Task A, is half-finished, you can specify a finish-to-start dependency with a lead time of 50% for the successor task. Enter lead times as negative numbers. In this example, enter -50% in the first cell of the Lag column. Adding lead times is also called *fast tracking* and is one way to compress a project's schedule.

A.34

Lag time is the opposite of lead time; it is a time gap or delay between tasks that have a dependency. If you need a two-day delay between the finish of Task C and the start of Task D, establish a finish-to-start dependency between Tasks C and D and specify a two-day lag time. Enter lag time as a positive value. In this example, type 2d in the Lag column.

In the Project Tracking Database example, notice that work on design tasks does not begin until all the work on the analysis tasks has been completed (see Rows 10 and 11), and work on implementation tasks does not begin until all the work on the design tasks has been completed (see Rows 11 and 12). In reality, it is rare to wait until all of the analysis work is complete before starting any design work, or to wait until all of the design work is finished before starting any implementation work. It is also a good idea to add some additional time, or a buffer, before crucial milestones, such as a system being implemented. To create a more realistic schedule, add lead times to the design and implementation tasks and lag time before the system implemented milestone.

To add lead and lag times:

1. Open the *Task Information* dialog box for Task 11, **Design**. In the Task Name column, double-click the text for Task 11, **Design**. The Task Information dialog box opens. Click the **Predecessors** tab.
2. Enter lead time for Task 11. Type **-10%** in the Lag column, as shown in Figure A-28. Click **OK**. You could also type a value such as **-5d** to indicate a five-day overlap. In the resulting Gantt chart, notice that the bar for this task has moved slightly to the left. Also, notice that the project completion date has moved.

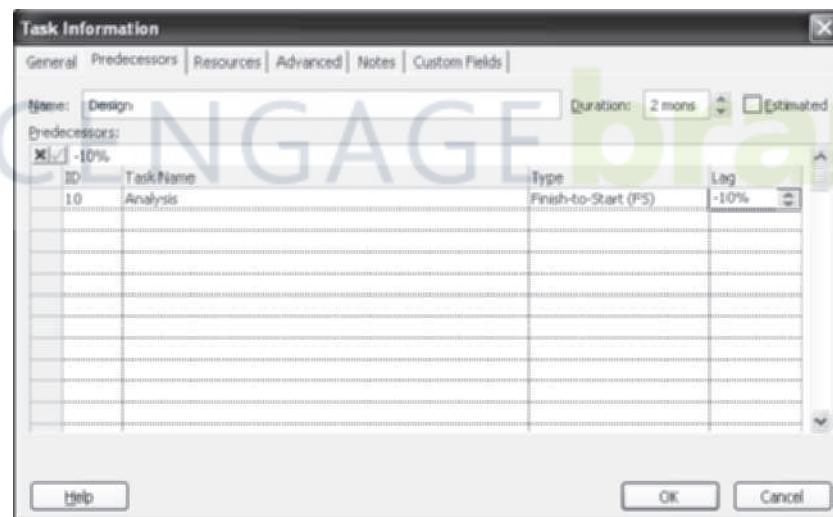


FIGURE A-28 Adding lead or lag time to task dependencies

3. Enter lead time for Task 12. Double-click the text for Task 12, **Implementation**, type **-3d** in the Lag column, and click **OK**. Notice that the project end date has again changed.

4. Enter lag time for Task 13. Double-click the text for Task 13, **System Implemented**, type **5d** in the Lag column for this task, and click **OK**. Move the split bar to the right, if necessary, to reveal the Predecessors column. Also adjust the timescale using the Zoom Slider, if needed, to see all of the Gantt chart symbols. When you are finished, your screen should resemble Figure A-29. Notice the slight overlap in the taskbars for Task 10 and the short gap between the taskbars for Tasks 11, 12, and 13. Also notice the changes in the Predecessors column for tasks 11 and 12. The project completion date should be 7/19 after these changes are made.

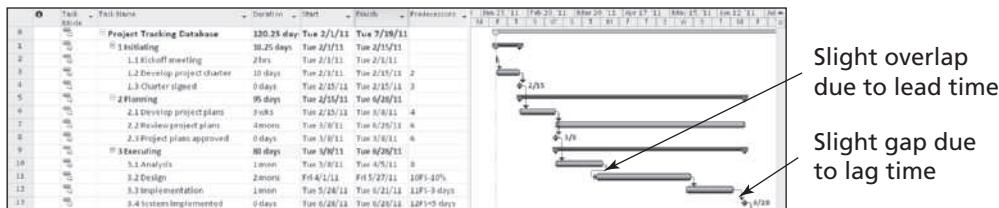
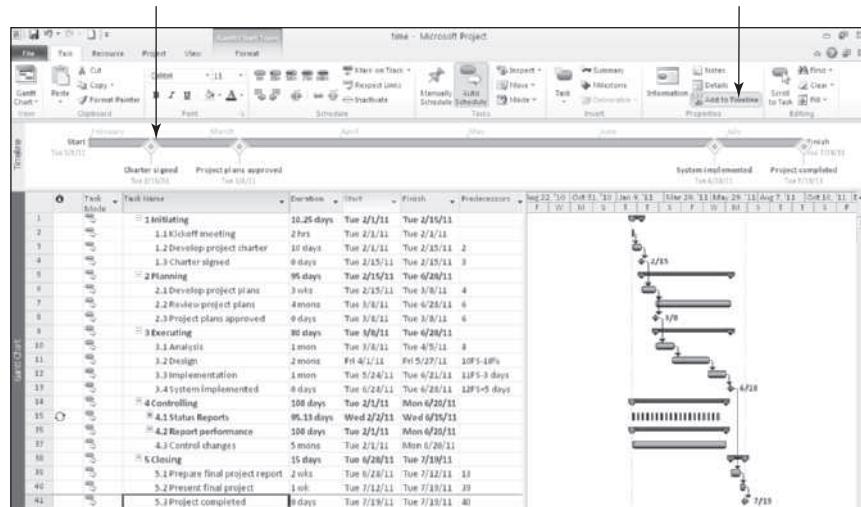


FIGURE A-29 Schedule for Project Tracking Database file with lead and lag times

TIP

You can enter or modify lead or lag times directly in the Predecessors column of the Entry table. Notice how the predecessors appear for Tasks 11, 12, and 13. For example, the Predecessors column for Task 11 shows 10FS-10%. This notation means that Task 11 has a finish-to-start (FS) dependency with Task 10 and a 10% lead. You can enter lead or lag times to task dependencies directly into the Predecessors column of the Entry table by using this same format: task row number, followed by type of dependency, followed by the amount of lead or lag.

5. Add tasks to the Timeline. Under Task Name, click **Charter Signed**, the task name for Task 4. Click the **Add to Timeline** button under the Properties group of the Task tab, as shown in Figure A-30. Notice that this task is now added to the Timeline. Add the other milestones, **Tasks 8, 13, and 41** to the Timeline. The new Timeline feature makes it display high level schedule information. For example, you might want to just show the timeline to senior management as part of a presentation instead of a full Gantt chart. You can right-click the Timeline and select **Copy Timeline** (or click the **Copy Timeline** button under the Format tab) to easily copy it into an e-mail or presentation.

Task added to Timeline**FIGURE A-30** Adding tasks to the Timeline

- Save your file. Click the Save button on the Quick Access toolbar. Keep this file open for the next set of steps.

Gantt Charts

Project 2010 shows a Gantt chart as the default view to the right of the Entry table. Gantt charts show the timescale for a project and all of its activities. In Project 2010, dependencies between tasks are shown on the Gantt chart by the arrows between tasks. Many Gantt charts, however, do not show any dependencies. Instead, as you might recall, network diagrams or PERT charts are used to show task dependencies. This section explains important information about Gantt charts and describes how to make critical path information more visible in the Gantt Chart view.

You must follow a few important procedures when working with Gantt charts:

- To adjust the timescale, click the Zoom Out button or the Zoom In button on the Zoom Slider . Clicking these buttons automatically makes the dates on the Gantt chart show more or less information. For example, if the timescale for the Gantt chart is showing months and you click the Zoom Out button, the timescale will adjust to show quarters. Clicking Zoom Out again will display the timescale in years. Similarly, each time you click the Zoom In button, the timescale changes to display more detailed time information—from years to quarters, quarters to months, and months to weeks.
- You can also adjust the timescale and access more formatting options by clicking on the Gantt chart and selecting the Format tab. For example, by checking the Critical Task checkbox, critical tasks will display in red on the Gantt chart.
- You can view a tracking Gantt chart by setting a baseline for your entire project or for selected tasks and then entering actual durations for tasks. The Tracking

Gantt view displays two taskbars, one above the other, for each task. One taskbar shows planned or baseline start and finish dates, and the other taskbar shows actual start and finish dates. You will find a sample Tracking Gantt chart later in this appendix, after you enter actual information for the Project Tracking Database project.

Because you have already created task dependencies, you can now find the critical path for the Project Tracking Database project. You can view the critical tasks by changing the color of those items on the Gantt chart. Tasks on the critical path will automatically be red in the Network Diagram view, as described in the following section.

To make the Gantt chart symbols for the critical path tasks appear in red:

1. *Format the Gantt chart for critical tasks.* Click the **Format** tab, and then click the **Critical Tasks** check box under the Bar Styles group. The symbols for critical tasks display in red on the Gantt chart. Your screen should resemble Figure A-31.

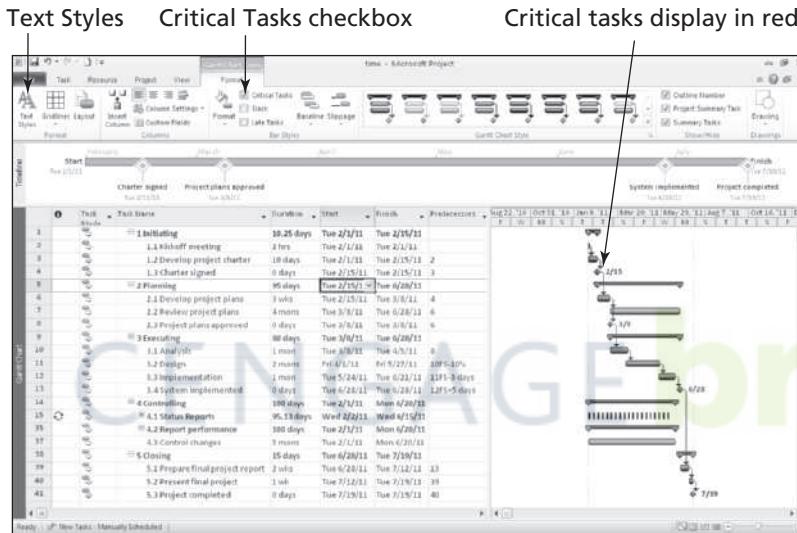
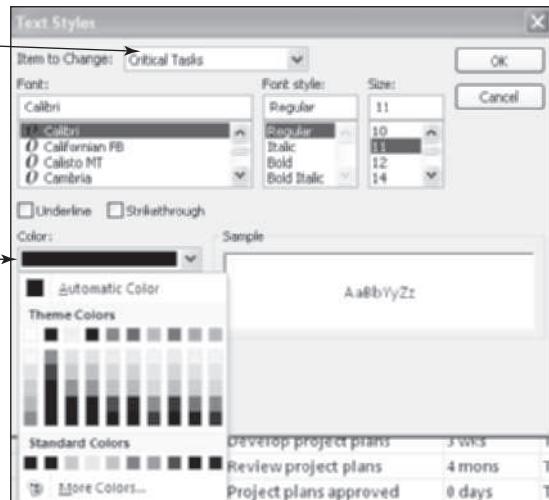


FIGURE A-31 Formatting the Gantt chart

2. *Format the text color for critical tasks.* Click the **Text Styles** button under the **Format** group. Click the **Item to Change** list arrow, and then select Critical Tasks. Click the **Color** list arrow, and then select a different color, such as red, as shown in Figure A-32. Click **OK** to accept the changes.

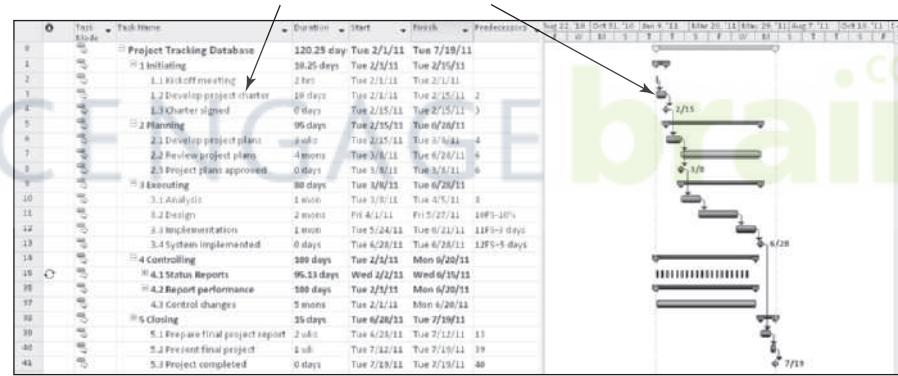
A.38

Select Critical Tasks

**FIGURE A-32** Formatting text for critical tasks

- Save your file.* Click **Save** on the Quick Access toolbar to save your file. It should resemble Figure A-33. Keep this file open for the next set of steps.

Text and Gantt chart symbols for critical tasks, such as Tasks 2 and 3, should display in red on your computer.

**FIGURE A-33** Formatted Gantt chart

Network Diagrams

The network diagrams in Project 2010 use the precedence diagramming method, with tasks displayed in rectangular boxes and relationships shown by lines connecting the boxes. In the Network Diagram view, tasks on the critical path are automatically shown in red.

To view the network diagram for the Project Tracking Database project:

- View the network diagram.* Click the **View** tab, and then click the **Network Diagram** button under the Task Views group.

2. *Adjust the Network Diagram view.* To see more tasks in the Network Diagram view, move the **Zoom Out** button on the Zoom Slider. Figure A-34 shows several of the tasks in the Project Tracking Database network diagram. Note that milestone tasks, such as Charter signed, appear as pointed rectangular boxes, while other tasks appear as rectangles. Tasks on the critical path automatically appear in red, while noncritical tasks appear in blue. Each task in the network diagram also shows information such as the start and finish dates, task ID, and duration. Move your mouse over the Charter signed box to see it in a larger view. A dashed line on a network diagram represents a page break. You often need to change some of the default settings for the Network Diagram view before printing it.

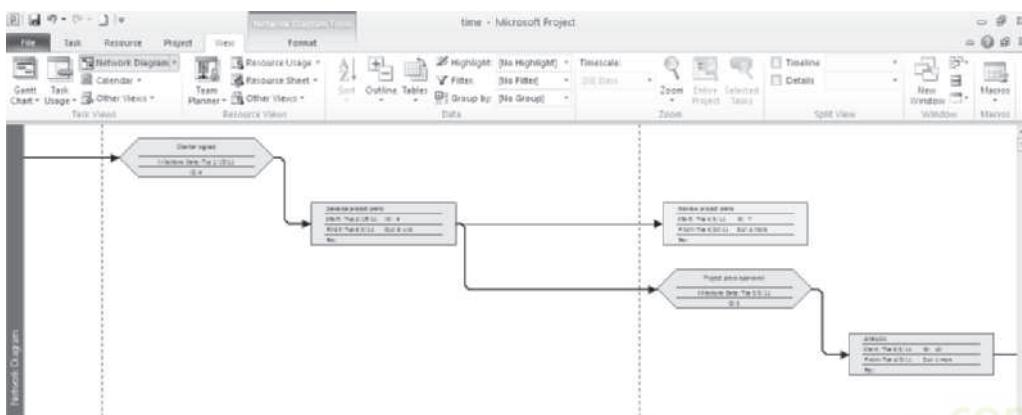
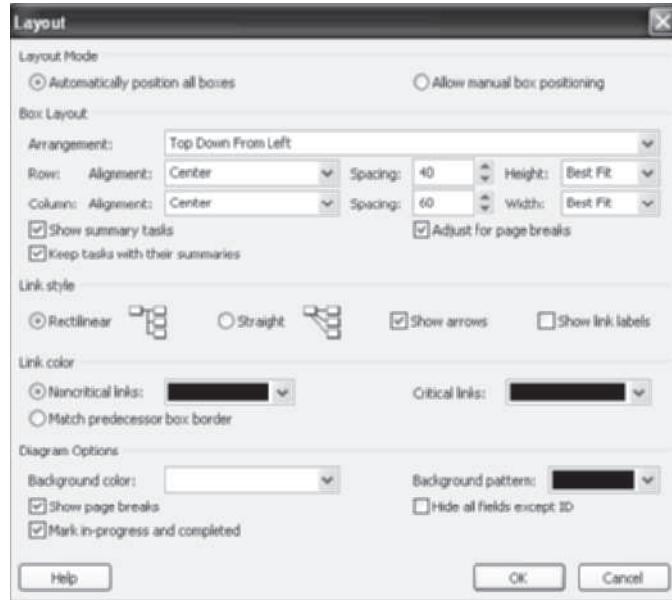


FIGURE A-34 Network Diagram view

3. *Change the format/layout of the network diagram.* Click the Format tab, and then click the Layout button under the Format group. The Layout dialog box displays, as shown in Figure A-35. Note that you can change several layout options for the network diagram, such as manually positioning boxes, changing the link style, changing colors, and so on. Click OK to close the Layout dialog box.

A.40**FIGURE A-35** Changing the network diagram layout

- Return to Gantt Chart view.* Click the View tab, and then click the Gantt Chart button under the Task Views group. Keep this file open for the next set of steps.

TIP

Some users prefer to create or modify files in Network Diagram view instead of Gantt Chart view. To add a new task or node in Network Diagram view, select the Task tab and then click the Task button under the Insert group. Double-click the new node to add a task name and other information. Create finish-to-start dependencies between tasks in Network Diagram view by clicking the preceding node and dragging to the succeeding node. To modify the type of dependency and add lead or lag time, double-click the arrow between the dependent nodes.

Critical Path Analysis

The critical path is the path through the network diagram with the least amount of slack; it represents the shortest possible time to complete the project. If a task on the critical path takes longer than planned, the project schedule will slip unless time is reduced on a task later on the critical path. Sometimes you can shift resources between tasks to help keep a project on schedule. Project 2010 has several views and reports to help analyze critical path information.

Two particularly useful features are the Schedule table view and the Critical Tasks report. The Schedule table view shows the early and late start dates for each task, the early

and late finish dates for each task, and the free and total slack for each task. This information shows how flexible the schedule is and helps in making schedule compression decisions. The Critical Tasks report lists only tasks that are on the critical path for the project. If meeting schedule deadlines is essential for a project, project managers will want to monitor tasks on the critical path closely.

To access the Schedule table view and view the Critical Tasks report for a file:

1. *View the Schedule table.* Right-click the **Select All** button to the left of the Task Name column heading and select **Schedule**. The **Schedule** table replaces the **Entry** table to the left of the Gantt chart.
2. *Reveal all columns in the Schedule table.* Move the split bar to the right until you see the entire Schedule table. Your screen should resemble Figure A-36. This view shows the start and finish (meaning the early start and early finish) and late start and late finish dates for each task, as well as free and total slack. Right-click the **Select All** button and select **Entry** to return to the Entry table view.

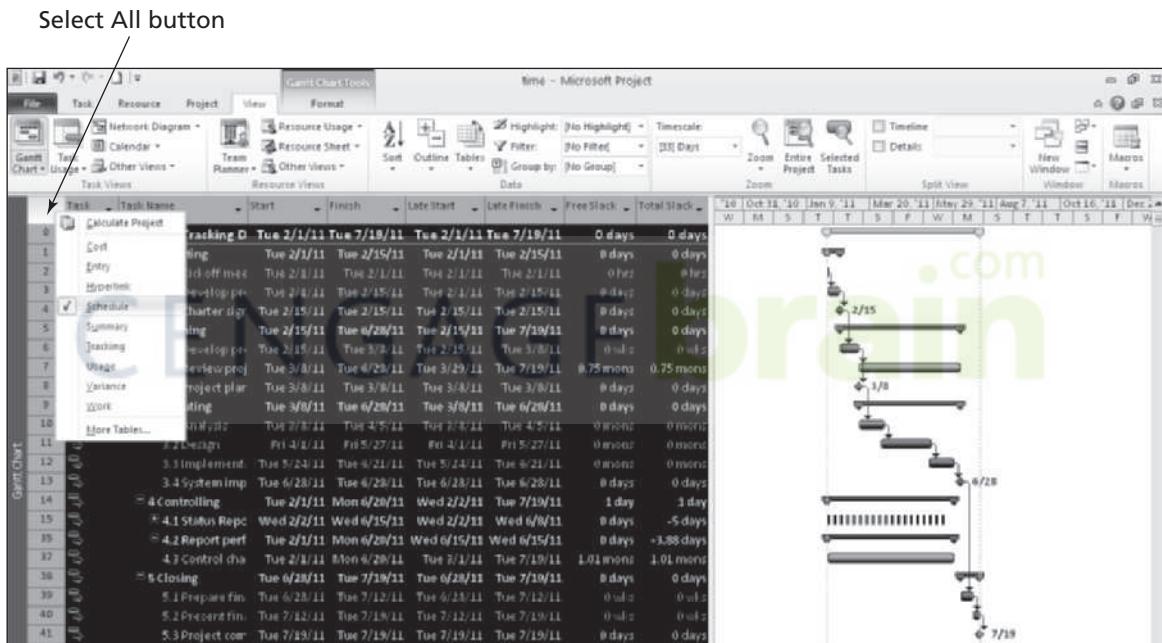


FIGURE A-36 Schedule table view

3. *Open the Reports dialog box.* Click the **Project** tab, and then click the **Reports** button under the Reports group. Double-click Overview to open the **Overview Reports** dialog box. Your screen should resemble Figure A-37.

A.42

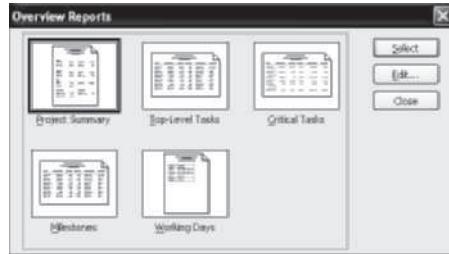


FIGURE A-37 Accessing the Critical Tasks report

4. *Display the Critical Tasks report.* Double-click **Critical Tasks**. A Critical Tasks report as of today's date is displayed. You can click **Page Setup** in the Backstage to adjust settings before printing.
5. *Close the report and save your file.* When you are finished examining the Critical Tasks report, click the **Task tab**. Save your file again by clicking **Save** on the Quick Access toolbar. Close Project 2010 if you are not continuing to the next section.

HELP

If you want to download the Project 2010 file time.mpp to check your work or continue to the next section, a copy is available on the companion Web site for this text, the author's Web site, or from your instructor.

Now that you have entered task durations, established task dependencies, and reviewed the network diagram and critical path information, you are ready to explore some of the Project 2010 cost management features.

PROJECT COST MANAGEMENT

Many people do not use Project 2010 for cost management. Most organizations have more established cost management software products and procedures in place, and many people simply do not know how to use the cost features of Project 2010. However, the cost features of Project 2010 make it possible to integrate total project information more easily. This section offers brief instructions for entering fixed and variable cost estimates and actual cost and time information after establishing a baseline plan. It also explains how to use Project 2010 for earned value management. More details on these features are available in Project 2010 Help, online tutorials, or other texts.

TIP

To complete the steps in this section, you need to use the Project 2010 file resourcee.mpp mentioned earlier. You can download it from the companion Web site for this text or from the author's Web site under Book FAQs.

Fixed and Variable Cost Estimates

The first step to using the cost features of Project 2010 is entering cost-related information. You enter costs as fixed or variable based on per-use material costs or variable based on the type and amount of resources used. Costs related to personnel are often a significant part of project costs.

Entering Fixed Costs in the Cost Table

The Cost table allows you to enter fixed costs related to each task. To access the Cost table, right-click the Select All button in the Entry table and select Cost. You can also assign a per-use cost to a resource that represents materials or supplies and use it as a base for calculating the total materials or supplies cost of a task. See Project 2010 Help for details on this feature.

Entering Human Resource Costs

Human resources represent a major part of the costs on many projects. By defining and then assigning human resources and their related costs to tasks in Project 2010, you can calculate human resource costs, track how people are used, identify potential resource shortages that could force you to miss deadlines, and identify underutilized resources. It is often possible to shorten a project's schedule by reassigning underutilized resources. This section focuses on entering human resource costs and assigning resources to tasks. The following section describes other features of Project 2010 related to human resource management.

Several methods are available for entering resource information in Project 2010. One of the easiest is to enter basic resource information in the Resource Sheet, accessible from the View tab. The Resource Sheet allows you to enter the resource name, initials, resource group, maximum units, standard rate, overtime rate, cost/use, accrual method, base calendar, and code. Entering data into the Resource Sheet is similar to entering data into an Excel spreadsheet, and you can easily sort items by selecting Sort from the Project menu. In addition, you can use the Filter list on the Formatting toolbar to filter resources. Once you have established resources in the Resource Sheet, you can assign those resources to tasks in the Entry table with the list arrow that appears when you click a cell in the Resource Names column. The Resource Names column is the last column of the Entry table. You can also use other methods for assigning resources, as described in the following steps.

Next, you will use the Project 2010 file time.mpp, which you saved in the preceding section, to assign resources to tasks. (If you did not save your file, download it from the companion Web site or from the author's Web site.) Assume that there are four people working on the Project Tracking database project and that the only costs for this project are for these human resources. Kathy is the project manager; John is the business analyst; Mary is the database analyst; and Chris is an intern or trainee.

To enter basic information about each person into the Resource Sheet:

1. *Display the Resource Sheet view.* Open your Project 2010 file time.mpp, if necessary. Click the **View** tab, and then click the **Resource Sheet** button ▾ under the **Resource Views** group.
2. *Enter resource information.* Enter the information from Table A-4 into the Resource Sheet. Type the information as shown and press the **Tab** key to move to the next field. Notice that you are putting abbreviated job titles in the Initials column: PM stands for project manager; BA, business analyst; DA, database

analyst; and IN, intern. When you type the standard and overtime rates, you can just type 50, and Project 2010 will automatically enter \$50.00/hr. The standard and overtime rates entered are based on hourly rates. You can also enter annual salaries by typing the annual salary number followed by /y for “per year.” Leave the default values for the other columns in the Resource Sheet as they are. Your screen should resemble Figure A-38 when you are finished entering the resource data.

TABLE A-4 Project Tracking Database resource data

Resource Name	Initials	Group	Stand. Rate	Ovt. Rate
Kathy	PM	1	\$50.00/h	\$60.00/h
John	BA	1	\$40.00/h	\$50.00/h
Mary	DA	1	\$40.00/h	\$50.00/h
Chris	IN	1	\$20.00/h	\$25.00/h

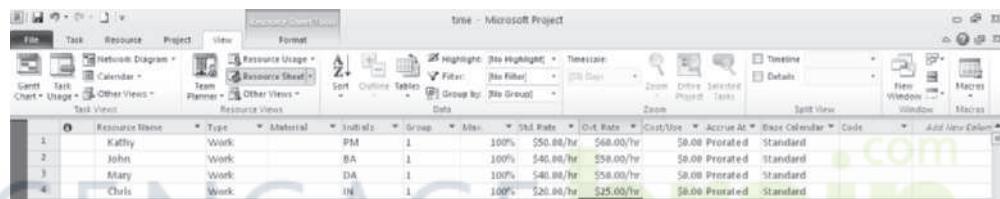


FIGURE A-38 Resource Sheet view with resource data entered

TIP

If you know that some people will be available for a project only part time, enter their percentage of availability in the Max Units column of the Resource Sheet. Project 2010 will then automatically assign those people based on their maximum units. For example, if someone can work only 25% of their time on a project throughout most of the project, enter 25% in the Max Units column for that person. When you enter that person as a resource for a task, his or her default number of hours will be 25% of a standard eight-hour workday, or two hours per day.

Adjusting Resource Costs

To make a resource cost adjustment, such as a raise, double-click the person’s name in the Resource Name column, select the Costs tab in the Resource Information dialog box, and then enter the effective date and raise percentage. You can also adjust other resource cost information, such as standard and overtime rates.

To give the project manager a 10% raise starting 4/1/11:

1. Open the *Resource Information* dialog box. In Resource Sheet view, double-click **Kathy** in the Resource Name column. The Resource Information dialog box opens.
2. Enter an effective date for a raise. Select the Costs tab, and then select tab **A**, if needed. Type **4/1/11** in the second cell in the Effective Date column and press **Enter**. Alternately, click the list arrow in the second cell and use the calendar that appears to enter the effective date, April 1, 2011.
3. Enter the raise percentage. Type **10%** in the second cell for the Standard Rate column, and then press **Enter**. The Resource Information screen should resemble Figure A-39. Notice that Project 2010 calculated the 10% raise to be \$55.00 per hour. Click **OK**.

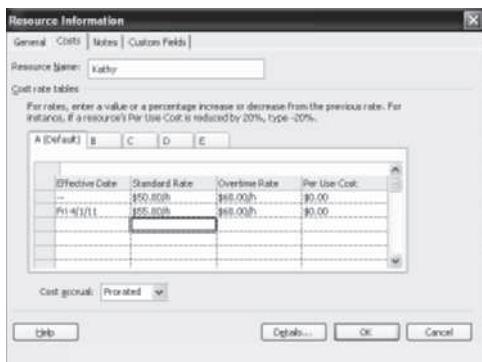


FIGURE A-39 Adjusting resource costs

Assigning Resources to Tasks

For Project 2010 to calculate resource costs, you must assign the appropriate resources to tasks in your WBS. There are several methods for assigning resources. The Resources column in the Entry table allows you to select resources using a list. You can use other methods to assign resources, such as the Assign Resources button or the split window, which is the recommended approach to have the most control over how resources are assigned because Project 2010 makes several assumptions about resource assignments that might change your schedule or costs. Next, you will use these three methods for assigning resources to the Project Tracking Database project.

Assigning Resources Using the Entry Table

To assign resources using the Entry table:

1. Select the task to which you want to assign resources. Click the **Gantt Chart** button on the View tab, and right-click the **Select All** button and click **Entry** to return to the Entry table, if needed.
2. Reveal the *Resource Names* column of the Entry table. Move the split bar to the right to reveal the entire Resource Names column in the Entry table.

3. Select a resource from the Resource Names column. In the Resource Names column, click the cell associated with Task 2, **Kickoff meeting**. Click the cell's list arrow, and then click the checkboxes next to **John** and **Kathy** to assign them to Task 2, as shown in Figure A-40. Notice that the resource choices are based on information that you entered in the Resource Sheet. If you had not entered any resources, you would not have a list arrow or any choices to select. Click in another cell to see the entered resources in the Resource column and on the Task 2 Gantt chart symbol.

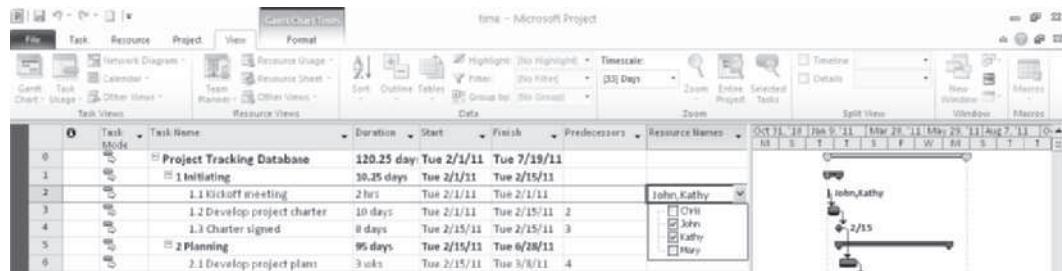


FIGURE A-40 Assigning resources using the Resource column

4. Clear the resource assignment. Click the Undo button on the Quick Access toolbar to remove the resource assignments.

Assigning Resources Using the Resource Tab

To assign resources using the Resource tab:

- Select the task to which you want to assign resources. In the second row of the Task Name column, click **Kickoff meeting**, the task name for Task 2.
- Open the Assign Resources dialog box. Click the Resource tab, and then click the Assign Resources button in the Assignments group. The Assign Resources dialog box, as shown in Figure A-41, displays.

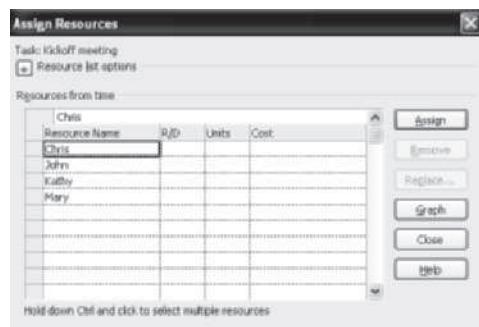


FIGURE A-41 Assign Resources dialog box

3. *Assign Kathy to Task 2.* Click **Kathy** in the Resource Name column of the Assign Resources dialog box, and then click **Assign**. Notice that the duration estimate for Task 2 remains at 2 hours, and Kathy's name appears on the Gantt chart by the bar for Task 2.
4. *Assign John to Task 2.* Click **John** in the Resource Name column of the Assign Resources dialog box, and then click **Assign**. Click **Close** in the Assign Resources dialog box. Notice that the duration for Task 2 remains at 2 hours, but an Exclamation point appears in the Indicator column for Task 2, as shown in Figure A-42. The default selection is to "Increase total work because the task requires more person-hours. Keep duration constant." That is what you want, so click **that option**, and the indicator symbol disappears. *This feature is a big change from previous versions of Microsoft Project, which automatically reduced the duration when more resources were added.*

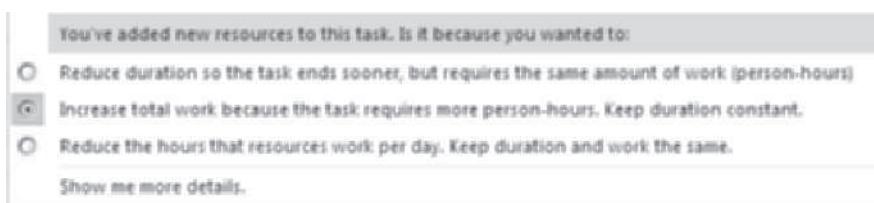


FIGURE A-42 Indicator column options

TIP

Project 2010 includes a multiple-level undo feature, so you can click the Undo button on the Quick Access toolbar several times to undo several steps in your file.

Assigning Resources Using the Split Window

Even though using the Assign Resources button seems simple, it is often better to use a split when assigning resources. When you assign resources using the split view, you have more control over how you enter information and can visually see the cost table and Gantt chart changes in the top window as you assign each resource in the bottom window.

To assign both Kathy and John to attend the two-hour kickoff meeting using the split window:

1. *Open the Cost table view.* Right-click the **Select All** button, and then click **Cost** to reveal the Cost table. Notice that Task 2 shows a cost of \$180 after assigning Kathy and John to it.
2. *Split the window to reveal more information.* Click the **Details** button under the Properties group of the Resource tab. The Gantt Chart view is displayed at the top of the screen and a resource form is displayed at the bottom of the screen.
3. *Assign Kathy to Task 3.* Select Task 3, **Develop project charter** in the top window, and then click the **Assign Resources** button, select **Kathy**, and **Close** the

dialog box. Notice the changes in both windows, as shown in Figure A-43. By default, resources are assigned to work full-time on tasks, so 80 hours, or two weeks of full-time work, are entered for Kathy, and a cost of \$4,000 is entered in the cost table. However, you only want to enter 40 hours for this task but leave its duration at two weeks.

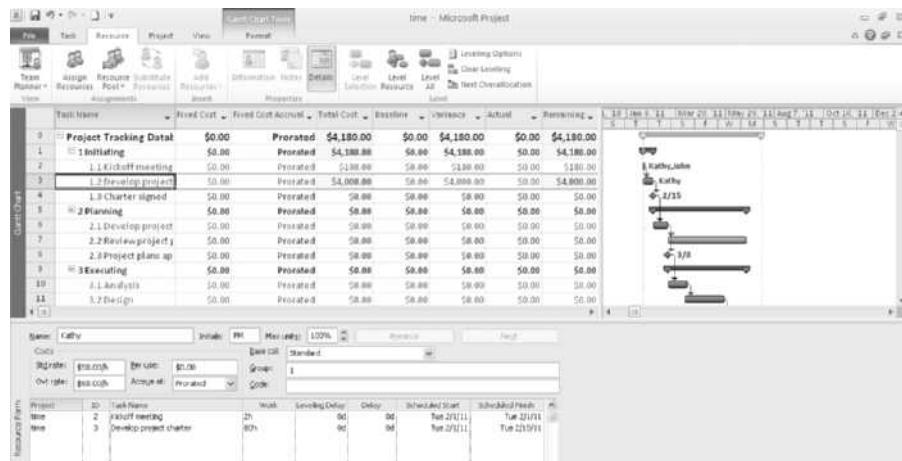


FIGURE A-43 Split screen for entering resource information

4. *Make Task 3 a manually scheduled task and change Kathy's hours to 80.* With Task 3 selected, click the Task tab, and then click the **Manually Scheduled** button under the Task group. In the bottom window, click the cell for the Work column in the bottom window for Task 2, and type 40h instead of 80h. Press OK. Notice that the cost for Task 2 changed from \$4,000 to \$2,000, but the duration for the task remained the same. If you left the task as automatically scheduled, its duration would have been shortened. You could assign all of the resources and then change the hours for one person at a time using the split screen.
5. *Close the file and do not save it.* Close the file, but do not save the changes you made. Other resource information has been entered for you in the Project 2010 file named resource.mpp.

HELP

A copy of the Project 2010 file resource.mpp is available on the companion Web site for this text, from the author's Web site under Book FAQs, or from your instructor. You must use this file to continue the steps in the next section.

As you can see, you must be careful when assigning resources and scheduling tasks. Project 2010 assumes that the durations of automatically scheduled tasks are not fixed, but are effort driven, and this assumption can create some problems when you are assigning resources.

Viewing Project Cost Information

Once you enter resource information, Project 2010 automatically calculates resource costs for the project. There are several ways to view project cost information. You can view the Cost table to see cost information, or you can run various cost reports. Next, you will view cost information for the Project Tracking Database project.

To view cost information:

1. *Open resource.mpp.* Download **resource.mpp** from the companion Web site or the author's site. Open the file.
2. *Open the Cost table.* Right-click the **Select All** button, and then click **Cost**. The Cost table displays various cost information. Your screen should resemble Figure A-44. Note that by assigning resources, costs have been automatically calculated for tasks. You could also enter fixed costs for tasks by simply typing them into the appropriate cell in the cost table.

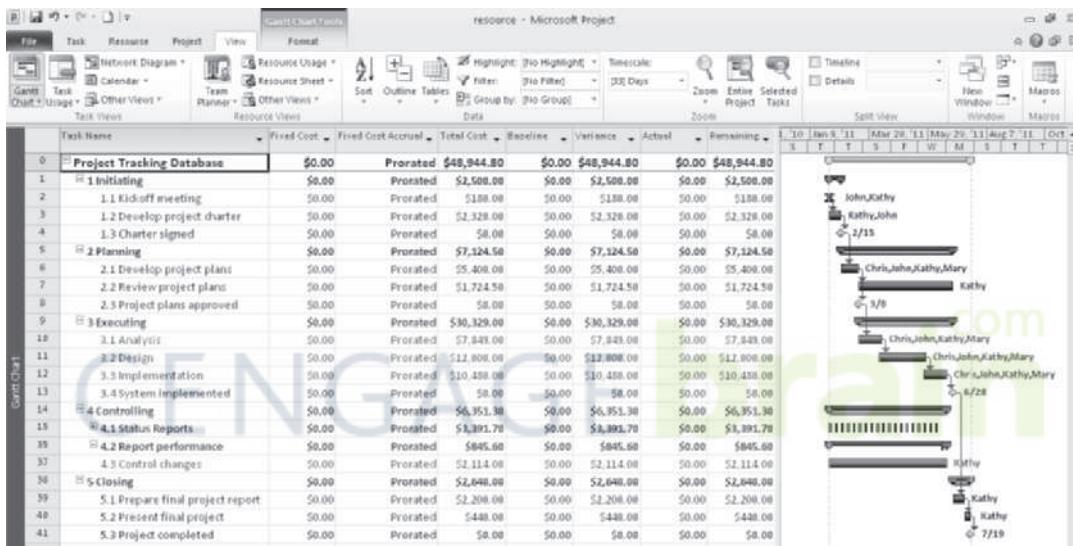
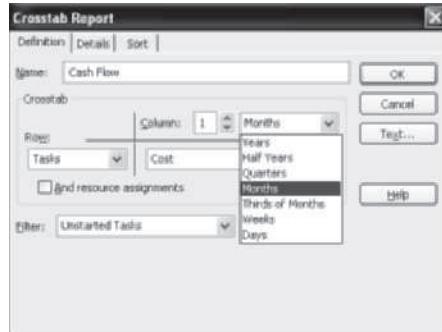


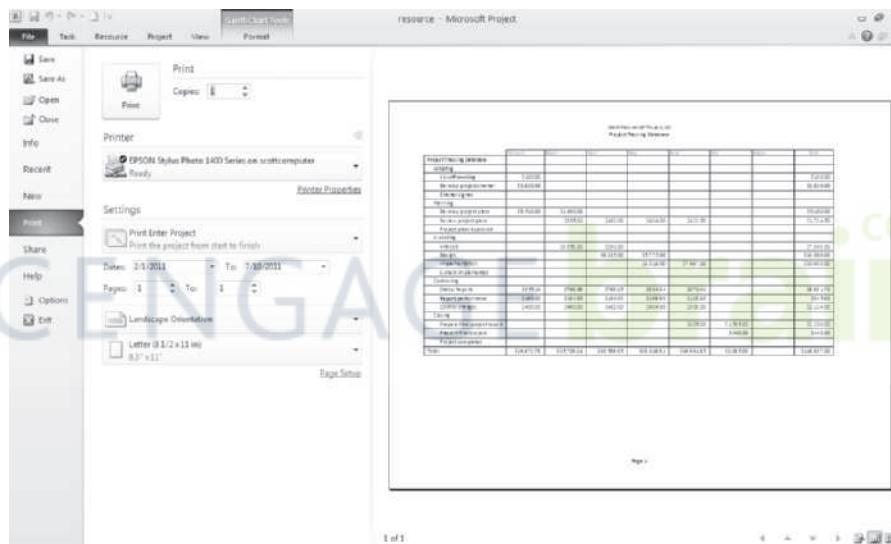
FIGURE A-44 Cost table for the resource file

3. *Open the Cost Reports dialog box.* Click the **Project** tab, and then click **Reports**. Double-click **Costs** to display the Cost Reports dialog box.
4. *Set the time units for the report.* Click **Cash Flow**, if necessary, and then click **Edit**. The Crosstab Report dialog box is displayed. Click the **Column** list arrow to see other options, but leave it at months, as shown in Figure A-45. Sometimes you need to edit default settings to make reports meet user needs. Click **OK**.

A.50

**FIGURE A-45** Crosstab Report dialog box

- View the *Cash Flow* report. Click Select in the Cost Reports dialog box. A Cash Flow report for the Project Tracking Database project appears in the Backstage, as shown in Figure A-46. Notice how it displays by WBS by month. Click the Project tab to close the report and return to the Gantt Chart view.

**FIGURE A-46** Cash Flow report

- View the *Project Summary* report. Click the **Reports** button again, double-click **Overview**, and then double-click **Project Summary**. A Project Summary report for the Project Tracking Database project is displayed, listing information such as project baseline start and finish dates; actual start and finish dates; summaries of duration, work hours, and costs; as well as variance information. Because you have not yet saved the file as a baseline, much of this information is blank in the report. The Project Summary report provides a high-level

overview of a project. Click the **Project** tab to close the report after reviewing it. Experiment with other reports, as desired. Keep this file open for the next set of steps.

TIP

You can edit many of the report formats in Project 2010. Instead of double-clicking the report, select the desired report, and then click **Edit**.

The total estimated cost for this project, based on the information entered, should be \$48,944.80, as shown in the Cash Flow and Project Summary reports. In the next section, you will save this data as a baseline plan and enter actual information.

Baseline Plan, Actual Costs, and Actual Times

Once you complete the initial process of creating a plan—entering tasks, establishing dependencies, assigning costs, and so on—you are ready to set a baseline plan. By comparing the information in your baseline plan to an updated plan during the course of the project, you can identify and solve problems. After the project ends, you can use the baseline and actual information to plan similar, future projects more accurately. To use Project 2010 to help control projects, you must establish a baseline plan, enter actual costs, and enter actual durations.

Establishing a Baseline Plan

An important part of project management is setting a baseline plan. If you plan to compare actual information such as durations and costs, you must first save the Project 2010 file as a baseline. Before setting a baseline, you must complete the baseline plan by entering time, cost, and human resources information. Be careful not to set a baseline until you have completed the baseline plan. If you do save a baseline before completing the baseline plan, Project 2010 allows you to save up to ten baselines. You can then clear unwanted baseline plans.

Even though you can clear a baseline plan or save multiple baselines, it is a good idea to save a separate, backup file of the original baseline for your project. Enter actuals and save that information in the main file, but always keep a backup baseline file without actuals. Keeping separate baseline and actual files will allow you to return to the original file in case you ever need to use it again.

To rename resource.mpp and then save it as a baseline plan in Project 2010:

1. *Save resource.mpp as a new file named baseline.mpp.* Click the **File** tab, and then click **Save As**. Type **baseline** as the filename, and then click **Save**. You can also download the baseline.mpp file from the Web site.
2. *Open the Save Baseline dialog box and save as a baseline.* Click the **Project** tab, click the **Set Baseline** button under the Schedule group, and click **Set Baseline**. Click the **Baseline** list arrow to reveal multiple baselines, as shown in Figure A-47. Notice that you can save up to ten baselines, and you can change the options if you do not want to save the Entire project. Also notice that after you set the baseline, the cost numbers in the Baseline column are updated. Keep the default settings, and click **OK**.

T I P

There are several options in the Save Baseline dialog box, as shown in Figure A-47. You can save the file as an interim plan if you anticipate several versions of the plan. You can also select the entire project or selected tasks when saving a baseline or interim plan. As mentioned above, you can save up to ten baselines with Project 2010.

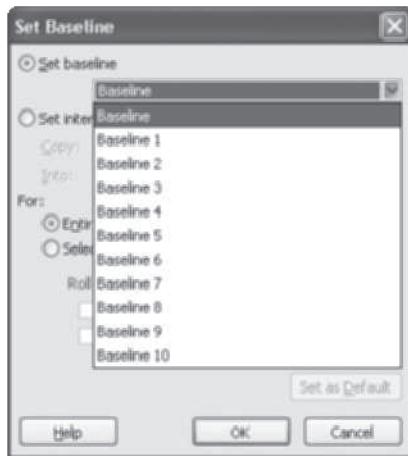


FIGURE A-47 Set Baseline dialog box

Entering Actual Costs and Times

After you set the baseline plan, you can track information on each of the tasks as the project progresses. You can also adjust planned task information for tasks still in the future. The Tracking table displays tracking information, and the Ribbon provides icons to help you enter this information. Figure A-48 describes each Tracking button.

Button	Name	Description
	0% Complete	Marks the selected tasks as 0% complete.
	25% Complete	Marks the selected tasks as 25% complete.
	50% Complete	Marks the selected tasks as 50% complete.
	75% Complete	Marks the selected tasks as 75% complete.
	100% Complete	Marks the selected tasks as 100% complete.
	Mark on Track	Marks the selected tasks so that they are on schedule. Set the status date on the Project tab to control what date is used in this calculation.
	Update Tasks	Shows the Update Tasks dialog box. You can update information for the selected tasks, such as mark percent complete, set actual or remaining duration, modify actual start and finish dates, and create notes.

FIGURE A-48 Tracking buttons

To practice entering actual information, enter just a few changes to the baseline. Assume that Tasks 1 through 8 were completed as planned, but that Task 10 took longer than planned. First you need to change the tasks to be automatically scheduled so the actual information, such as a critical task taking longer than planned, automatically adjusts any dependent tasks.

To enter actual information for tasks:

1. *Return to the Task tab and make the tasks automatically scheduled.* Click the Task tab, where the tracking buttons are located. Click the task name for Task 2, drag down through the task name for Task 41, and then click the Auto Schedule button under the Tasks group.
2. *Display the Tracking table.* Right-click the Select All button, and then click Tracking to see more tracking-related information as you enter actual data. Widen the Task Name column to see all of the text, and then move the split bar to reveal all the columns in the Tracking table. Make other adjustments as needed so your screen resembles Figure A-49.

A.54

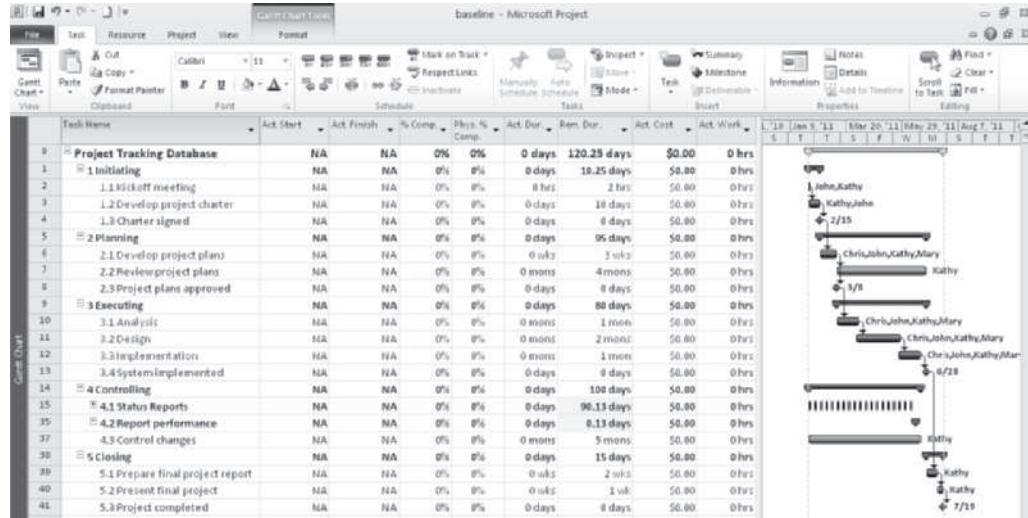


FIGURE A-49 Tracking table

- Set the **Status Date**. Click the **Project** tab, and then click the **Status Date** button under the **Status Group**. Type **4/15/11**, and then click **OK**. It is important to set the status date to make the tracking features work properly.
- Mark Tasks 1 through 8 as 100% complete. Click the **Task** tab. Click the Task Name for Task 1, **Initiating**, and drag down through Task 8 to highlight the first eight tasks. Click the **100% Complete** button under the **Schedule group** on the Ribbon. The columns with dates, durations, and cost information should now contain data instead of the default values, such as NA or 0. The % Comp column should display 100%. Adjust column widths if needed. Your screen should resemble Figure A-50. Note that you could also use the **Mark on Track** button to get the same results.

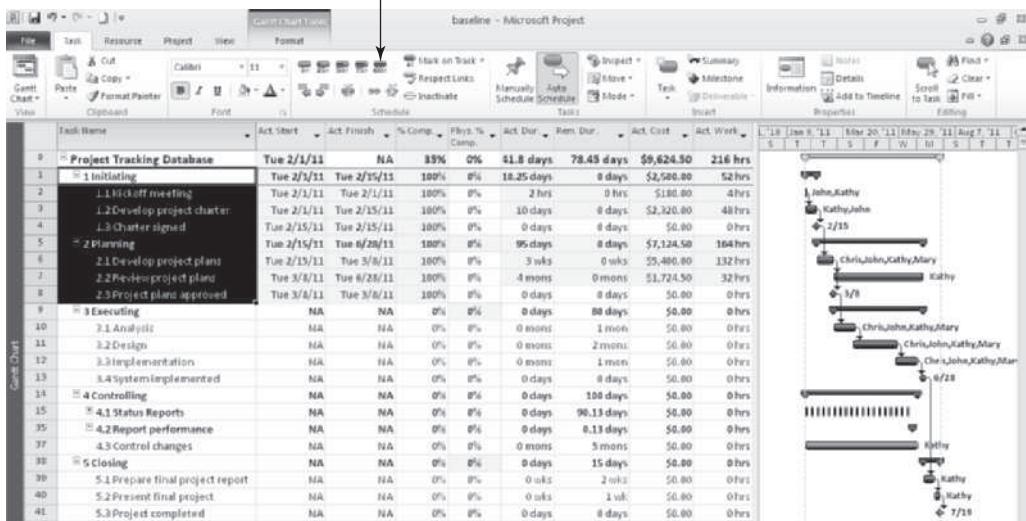


FIGURE A-50 Tracking table information

- Enter actual completion dates for Task 10. Click the Task Name for Task 10, Analysis, and then click the **Mark on Track** drop-down, and select **Update Tasks**. The Update Tasks dialog box opens. For Task 10, enter the Actual Start date as 3/10/11 and the Actual Finish date as 4/15/11, as shown in Figure A-51. Click **OK**. Notice how the information in the tracking sheet has changed and that the project completion date has moved from 7/19 to 7/29 because Task 10 was a critical task.

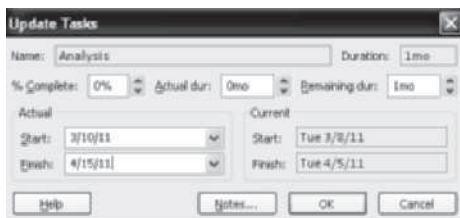
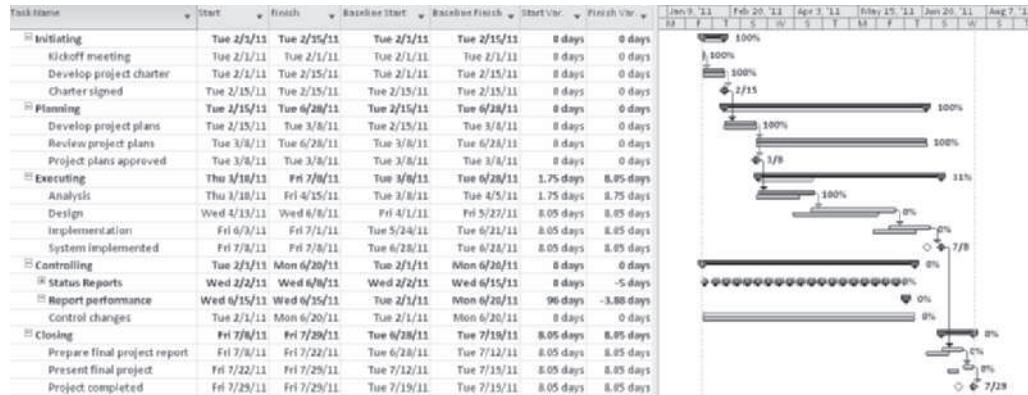


FIGURE A-51 Update Tasks dialog box

- View the Variance table. Right-click the **Select All** button, and then select **Variance** to display the Variance table. Adjust column widths, move the split bar, and adjust the Zoom Slider as needed so your screen resembles Figure A-52. Notice that there is now a finish variance of 8.05 days.

A.56**FIGURE A-52** Variance table

7. *Review changes using the Tracking Gantt chart.* Click the Gantt chart dropdown under the View group of the Task tab, and then click Tracking Gantt. Move the split bar to the left to reveal more of the Gantt chart, and adjust the Zoom slider and other screen elements until your screen resembles Figure A-53. Notice that the Gantt chart bars for completed tasks have changed. There are also a few new symbols, such as white diamonds, representing slipped milestones, for Tasks 13 and 41. Because the Analysis task preceded others on the critical path, such as Design, Implementation, and so on, they were delayed in starting. A good project manager would take corrective action to make up for this lost time or renegotiate the completion date.

**FIGURE A-53** Tracking Gantt chart

8. *Review the cost table and enter actual costs.* Right-click the Select All button, and then select Cost to display the Cost table. Move the split bar to the right, if needed, to display all of the columns. Notice that the Actual costs for tasks 1 through 8 are the same as the Baseline costs because they were entered as

100% complete. Also notice that the Actual cost for task 10, which took longer than planned, seems very high. Project 2010 makes several assumptions in calculating costs. In this case, we want to enter our own Actual cost. First click **Task 10** and make it manually scheduled by clicking the **Task** tab and then clicking the **Manually Schedule** button under the **Schedule** group. Type **10,000** in the **Actual** column for task 10, Analysis. Notice the changes in the Cost table, as shown in Figure A-54.

	Task Name	Fixed Cost	Fixed Cost Accrued	Total Cost	Baseline	Variance	Actual	Remaining
0	Project Tracking Database	\$0.00	Prorated	\$50,068.38	\$48,944.80	\$1,123.58	\$18,475.00	\$31,593.38
1	Initiating	\$0.00	Prorated	\$2,500.00	\$2,500.00	\$0.00	\$2,500.00	\$0.00
2	Kickoff meeting	\$0.00	Prorated	\$180.00	\$180.00	\$0.00	\$180.00	\$0.00
3	Develop project charter	\$0.00	Prorated	\$2,320.00	\$2,320.00	\$0.00	\$2,320.00	\$0.00
4	Charter signed	\$0.00	Prorated	\$8.00	\$8.00	\$0.00	\$0.00	\$0.00
5	Planning	\$0.00	Prorated	\$7,124.50	\$7,124.50	\$0.00	\$5,975.00	\$1,149.50
6	Develop project plans	\$0.00	Prorated	\$5,400.00	\$5,400.00	\$0.00	\$5,400.00	\$0.00
7	Review project plans	\$0.00	Prorated	\$1,724.50	\$1,724.50	\$0.00	\$575.00	\$1,149.50
8	Project plans approved	\$0.00	Prorated	\$8.00	\$8.00	\$0.00	\$0.00	\$0.00
9	Executing	\$0.00	Prorated	\$32,480.00	\$30,329.80	\$2,151.00	\$10,000.00	\$22,480.00
10	Analysis	(\$22,840.00)	Prorated	\$10,000.00	\$7,849.80	\$2,151.00	\$10,000.00	\$0.00
11	Design	\$0.00	Prorated	\$12,000.00	\$12,000.00	\$0.00	\$0.00	\$12,000.00
12	Implementation	\$0.00	Prorated	\$10,480.00	\$10,480.00	\$0.00	\$0.00	\$10,480.00
13	System implemented	\$0.00	Prorated	\$8.00	\$8.00	\$0.00	\$0.00	\$0.00
14	Controlling	\$0.00	Prorated	\$5,321.88	\$6,351.30	(\$1,027.42)	\$0.00	\$5,323.88
15	Status Reports	\$0.00	Prorated	\$3,208.78	\$3,391.70	(\$182.92)	\$0.00	\$3,208.78
16	Report performance	\$0.00	Prorated	\$1.10	\$845.60	(\$844.50)	\$0.00	\$1.10
17	Control changes	\$0.00	Prorated	\$2,114.00	\$2,114.00	\$0.00	\$0.00	\$2,114.00
18	Closing	\$0.00	Prorated	\$2,640.00	\$2,640.00	\$0.00	\$0.00	\$2,640.00
19	Prepare final project report	\$0.00	Prorated	\$3,200.00	\$2,200.00	\$0.00	\$0.00	\$3,200.00
20	Present final project	\$0.00	Prorated	\$440.00	\$440.00	\$0.00	\$0.00	\$440.00
21	Project completed	\$0.00	Prorated	\$8.00	\$8.00	\$0.00	\$0.00	\$0.00

FIGURE A-54 Updated Cost table

- Save your file as a new file named **tracking.mpp**. Click the **File** tab, and then click **Save As**. Name the file **tracking**, and then click **Save**.

After you have entered some actuals, you can also review earned value information, as described in the next section.

Earned Value Management

Earned value management is an important project management technique for measuring project performance. Because you have entered actual information for some of the tasks in the Project Tracking Database project, you can now view earned value information in Project 2010. You can also view an earned value report using the visual reports feature.

To view earned value information:

- View the Earned Value table.* Using the tracking.mpp file, right-click the **Select All** button, and then select **More Tables**. The More Tables dialog box opens. Double-click **Earned Value**.
- Display all the Earned Value table columns.* Move the split bar to the right to reveal all of the columns, as shown in Figure A-55. Note that the Earned Value table includes columns for each earned value acronym, such as SV, CV, and so on, as explained in this text. Also note that the EAC (Estimate at Completion) is higher than the BAC (Budget at Completion) starting with Task 9,

where the task took longer than planned to complete. Task 0, which represents the entire project, shows a CV of \$2,050.30 and a SV of \$6,544.40. Remember that not all of the actual information has been entered yet.

	Task Name	Planned Value - PV (BCWS)	Earned Value - EV (BCVF)	AC (ACWP)	SV	CV	EAC	BAC	VAC
0	Project Tracking Database	\$22,575.03	\$16,030.63	\$18,080.93 (\$6,544.40)	(\$2,050.30)	\$55,204.77	\$48,944.80 (\$6,239.97)		
1	Initiating	\$2,500.00	\$2,500.00	\$2,500.00	\$0.00	\$0.00	\$2,500.00	\$2,500.00	\$0.00
2	Kickoff meeting	\$180.00	\$180.00	\$180.00	\$0.00	\$0.00	\$180.00	\$180.00	\$0.00
3	Develop project charter	\$2,320.00	\$2,320.00	\$2,320.00	\$0.00	\$0.00	\$2,320.00	\$2,320.00	\$0.00
4	Charter signed	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
5	Planning	\$9,975.00	\$5,995.00	\$5,975.00	\$0.00	\$0.00	\$7,124.50	\$7,124.50	\$0.00
6	Develop project plans	\$5,400.00	\$5,400.00	\$5,400.00	\$0.00	\$0.00	\$5,400.00	\$5,400.00	\$0.00
7	Review project plans	\$575.00	\$575.00	\$575.00	\$0.00	\$0.00	\$1,724.50	\$1,724.50	\$0.00
8	Project plans approved	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
9	Executing	\$10,774.00	\$7,555.63	\$9,069.93 (\$3,218.37)	(\$2,050.30)	\$30,509.48	\$30,429.00 (\$6,430.00)		
10	Analysis	\$7,849.00	\$7,555.63	\$9,065.93 (\$293.37)	(\$2,050.30)	\$9,978.90	\$7,849.00 (\$2,129.90)		
11	Design	\$2,925.00	\$0.00	\$0.00 (\$2,925.00)	\$0.00	\$12,000.00	\$12,000.00	\$0.00	
12	Implementation	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$10,480.00	\$10,480.00	\$0.00
13	System implemented	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
14	Controlling	\$3,326.93	\$0.00	\$0.00 (\$3,326.93)	\$0.00	\$6,323.88	\$6,351.30	\$1,027.42	
15	Status Reports	\$1,814.03	\$0.00	\$0.00 (\$1,814.03)	\$0.00	\$3,208.78	\$3,391.70	\$182.92	
16	Report performance	\$432.00	\$0.00	\$0.00 (\$432.00)	\$0.00	\$1.10	\$845.60	\$844.50	
17	Control changes	\$1,088.00	\$0.00	\$0.00 (\$1,088.00)	\$0.00	\$2,114.00	\$2,114.00	\$0.00	
18	Closing	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2,640.00	\$2,640.00	\$0.00
19	Prepare final project report	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2,200.00	\$2,200.00	\$0.00
20	Present final project	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$440.00	\$440.00	\$0.00
21	Project completed	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

FIGURE A-55 Earned Value table

- View the earned value chart. Click the Project tab, and then click the Visual Reports button under the Reports group to open the Visual Reports dialog box. Click Earned Value Over Time Report, as shown in Figure A-56. Notice the sample of the selected report on the right side of the dialog box. If you have Excel, click View to see the resulting report as Project 2010 automatically creates Excel data and a chart based on your current file. Close Excel without saving the file, and then click the Close button of the Visual Reports dialog box.

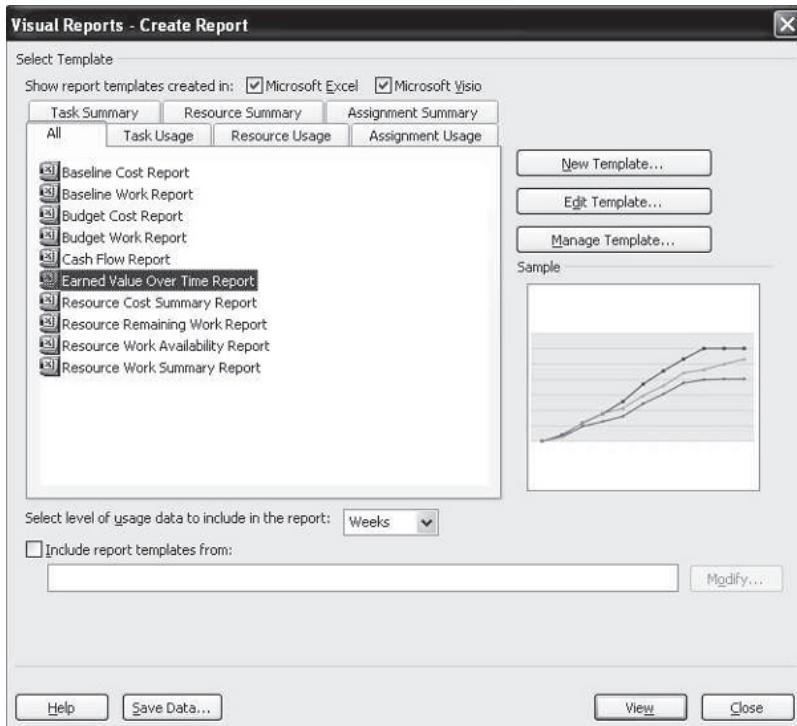


FIGURE A-56 Visual Reports dialog box

HELP

To take full advantage of the visual reports features, you must have specific software installed on your computer. You may also need to adjust data, such as displaying weeks or months versus quarters, to get the reports to display as desired.

4. *Save and close the file.* Click the Save button  on the Quick Access toolbar, and then close the tracking.mpp file. You can also exit Project 2010 and take a break, if desired.

HELP

If you want to download the Project 2010 files baseline.mpp and tracking.mpp to check your work or continue to the next section, a copy is available on the companion Web site, the author's Web site, or from your instructor.

Now that you have entered and analyzed various project cost information, you will examine some of the human resource management features of Project 2010.

PROJECT HUMAN RESOURCE MANAGEMENT

In the project cost management section, you learned how to enter resource information into Project 2010 and how to assign resources to tasks. Two other helpful human resource features include resource calendars and histograms. In addition, it is important to know how to use Project 2010 to assist in resource leveling. You will also explore the new Team Planner feature, which can also help to level resources.

Resource Calendars

When you created the Project Tracking Database file, you used the standard Project 2010 calendar. This calendar assumes that standard working hours are Monday through Friday, from 8:00 a.m. to 5:00 p.m., with an hour for lunch starting at noon. Rather than using this standard calendar, you can create a different calendar that takes into account each project's unique requirements. You can create a new calendar by using the Tasks pane or by changing the working time under the Tools menu.

To create a new base calendar:

1. Open a new file and access the Change Working Time dialog box. After opening a blank file in Project 2010, click the Project tab, and then click the **Change Working Time** button under the Properties group. The Change Working Time dialog box opens, as shown in Figure A-57.

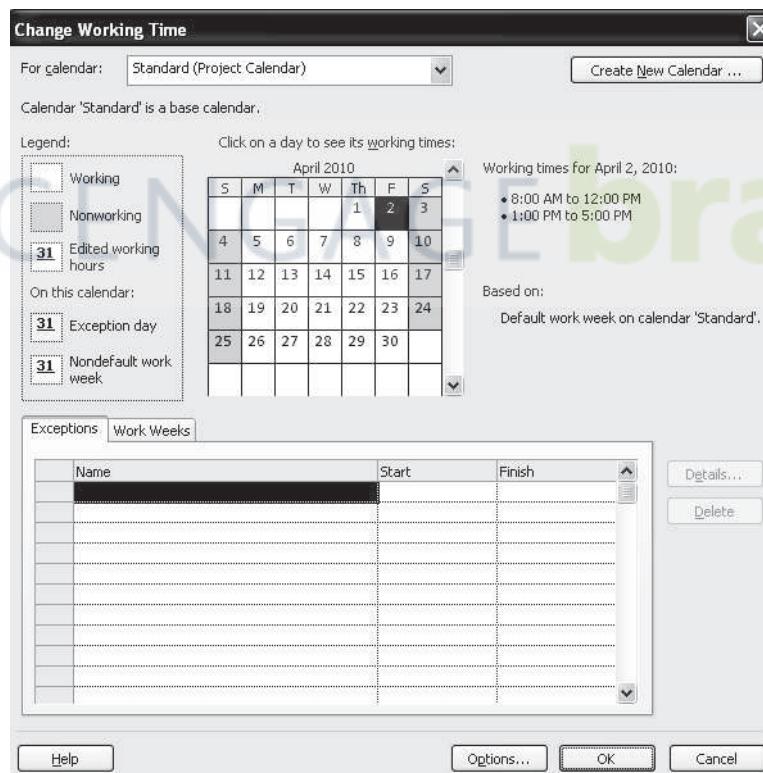


FIGURE A-57 Change Working Time dialog box

2. *Name the new base calendar.* In the Change Working Time dialog box, click **Create New Calendar**. The Create New Base Calendar dialog box opens. Click the **Create new base calendar** radio button, type **Mine** as the name of the new calendar in the **Name** text box, and then click **OK**. Click the **Options** button, and then make desired changes, such as changing the month when the fiscal year starts. Click **OK** to close the Change Working Time dialog box.

You can use this new calendar for the whole project, or you can assign it to specific resources on the project.

To assign the new calendar to the whole project:

1. *Open the Project Information dialog box.* Click the **Project** tab, and then click the **Change Working Time** button. The Project Information dialog box opens.
2. *Select a new calendar.* Click the **Calendar** list arrow to display a list of available calendars. Select your new calendar named **Mine** from this list, and then click **OK**.

To assign a specific calendar to a specific resource:

1. *Assign a new calendar.* Click the **View** tab, and then click the **Resource Sheet** button under the Resource Views group. Type **Me** in the Resource Name column, and press **Enter**.
2. *Select the calendar.* Click the **Base Calendar** cell for that resource name. If the **Base Calendar** column is not visible, click the horizontal scroll bar to view more columns. Click the **Base Calendar** list arrow to display the options, and then select **Mine**, if needed.
3. *Block off vacation time.* Double-click the resource name **Me** to display the Resource Information dialog box, and then click the **Change Working Time** button, located on the General tab in the Resource Information dialog box. You can block off vacation time for people by selecting the appropriate days on the calendar and marking them as nonworking days. Click **OK** to accept your changes, and then click **OK** to close the Resource Information dialog box.
4. *Close the file without saving it.* Click the **Close** icon, and click **No** when you are prompted to save the file.

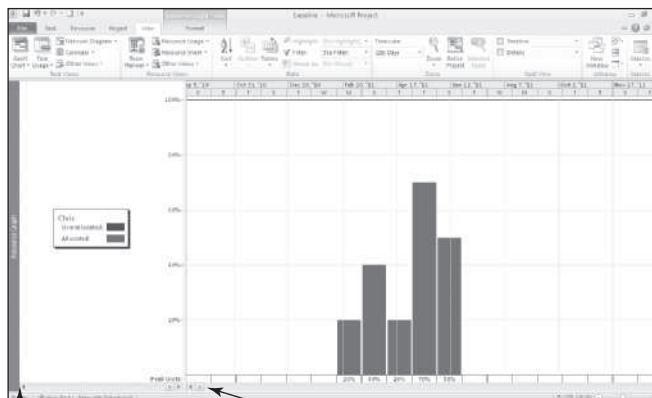
Resource Histograms

A resource histogram is a type of chart that shows the number of resources assigned to a project over time. A histogram by individual shows whether a person is over- or underallocated during certain periods. The Resource Graph helps you see which resources are overallocated, by how much, and when. It also shows you the percentage of capacity each resource is scheduled to work, so you can reallocate resources, if necessary, to meet the needs of the project.

To view resource histograms for the Project Tracking Database project:

1. *View the Resource Graph.* Open the **baseline.mpp** file, and click the **View** tab, if necessary. Click the **Other Views** button under the Resource Views group, and then click the **Resource Graph** button . A histogram for Chris appears, as shown in Figure A-58. The screen is divided into two sections: the left pane displays a person's name and the right pane displays a resource histogram for

that person. You may need to click the right scroll bar to get the histogram to appear on your screen. Notice that Kathy is overallocated slightly in the month of June, because the column for that month goes above the 100% line.



Click to access other resource graphs Move scroll bar and adjust timescale as needed

FIGURE A-58 Resource Graph view

2. *View the other resources' histograms.* Click the **left scroll arrow** at the bottom of the resource name pane on the left side of the screen. The resource histogram for the next person appears. View the resource histograms for all four people, and then go back to Kathy's. Click the **Zoom In** button several times until the information is displayed in days. Move the scroll bar until you see the information for the first day of the project, as shown in Figure A-59.

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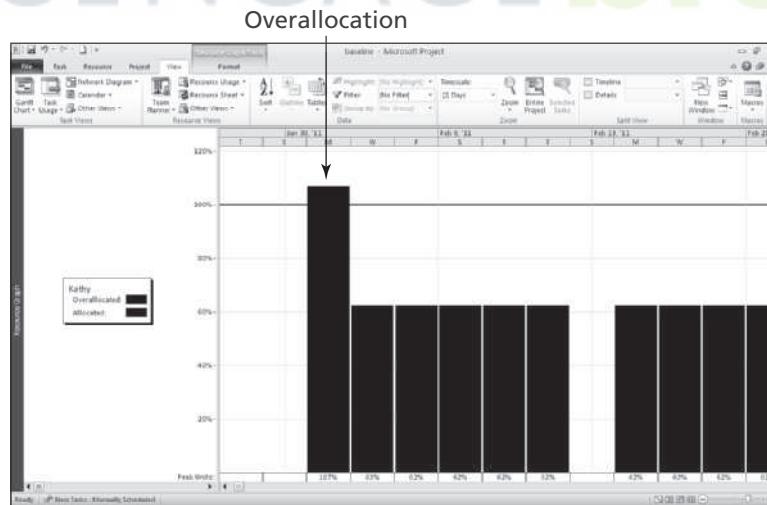


FIGURE A-59 Resource Graph showing an overallocation

Notice that Kathy's histogram has a partially red bar on the first day of the project. This red portion of the bar means that she has been overallocated that day. The percentages at the bottom of each bar show the percentage each resource is assigned to work. For example, Kathy is scheduled to work 107% of her available time the first day, and 62% of her available time the next several days. You can use the Resource Usage view to see more details on the overallocation.

To see more details about an overallocated resource using the Resource Usage view:

1. *Display the Resource Usage view.* Click the **Resource Usage** button  under the Resource Views group on the Ribbon.
2. *Adjust the information displayed.* On the right side of the screen, click the scroll arrows to display the hours Kathy is assigned to work each day. Widen the Resource Name column and make other adjustments as needed so your screen resembles Figure A-60.

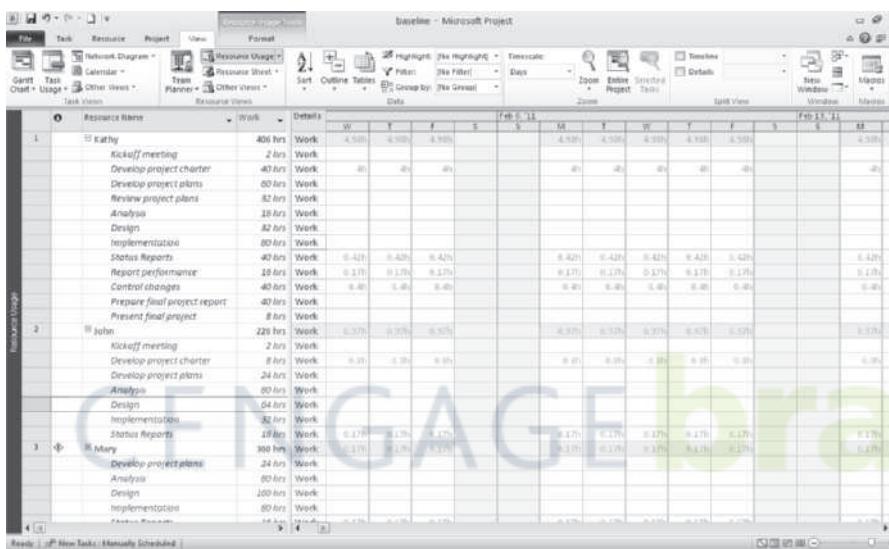


FIGURE A-60 Resource Usage view

3. *Examine overallocation information.* Notice in the Resource Usage view (Figure A-60) that Kathy is only scheduled to work 5.57h on the first day of the project.

Although Kathy is not scheduled to work more than eight hours on that day, some of the tasks were entered as hours, and Project 2010 assumes those hours start as soon as possible, thus causing the scheduling conflict. Also notice that Mary is overallocated. Next, you will remove the overallocations by using resource leveling.

Resource Leveling

Resource leveling is a technique for resolving resource conflicts by delaying tasks. Resource leveling also creates a smoother distribution of resource usage. You can find detailed information on resource leveling in the Help facility.

To use resource leveling:

1. *View Kathy's Resource Graph again.* Click the **Resource Graph** button under the View tab to view Kathy's histogram again. Make adjustments as needed to see the graph for the first day of the project. Remember that just Kathy and Mary showed overallocations.
2. *Open the Resource Leveling dialog box.* Click the **Resource** tab, and then click **Leveling Options**. The Level Resources dialog box opens, as shown in Figure A-61.

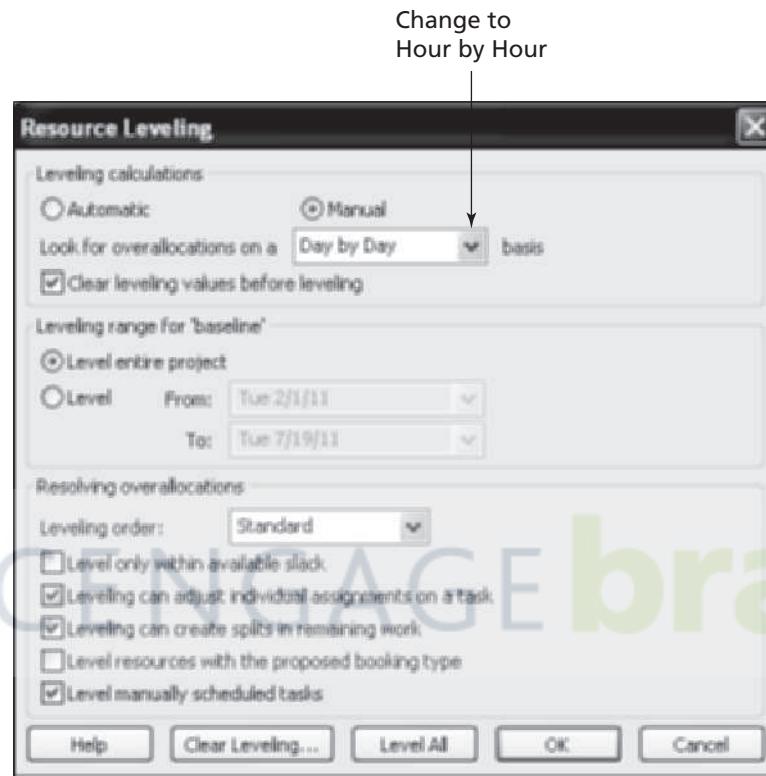


FIGURE A-61 Resource Leveling dialog box

3. *Level using the Hour by Hour option.* Change the basis for leveling from Day by Day to **Hour by Hour**, click the **Level All** button, keep the other default options in the Level Now dialog box. Notice that Kathy's overallocation disappears. Click the scroll arrow in the resource name pane to reveal information about other resources to see that their overallocations are gone as well.

TIP

If you want to undo the leveling, immediately click the Undo button on the Standard toolbar. Alternatively, you can return to the Resource Leveling dialog box, and click the Clear Leveling button.

4. Save the file as *level.mpp*. Click the File tab, click Save As, type **level** as the filename, and then click **Save**. Close the file and Project 2010.

HELP

If you want to download the Project 2010 file *level.mpp* to check your work or continue to the next section, a copy is available on the companion Web site, the author's Web site, or from your instructor.

Consult the Project 2010 Help feature and use the keyword "level" for more information on resource leveling. Also, when setting options for this feature, be careful that the software adjusts resources only when it should. For example, the end date for a project might be pushed back if you set the leveling options not to level only within available slack. In this case, the project manager might prefer to ask his or her team to work a little overtime to remain on schedule.

Using the New Team Planner Feature*

Another way to assign resources and reduce overallocations is by using the new Team Planner feature. Assume you have two people assigned to work on a project, Brian and Cindy, as shown in Figure A-62. Notice that Brian is assigned to work on both Task 1 and Task 2 full-time the first week. Therefore, Brian is overallocated. Cindy is scheduled to work on Task 3 full-time the second week, and Task 4, also scheduled for the second week, is not assigned yet.

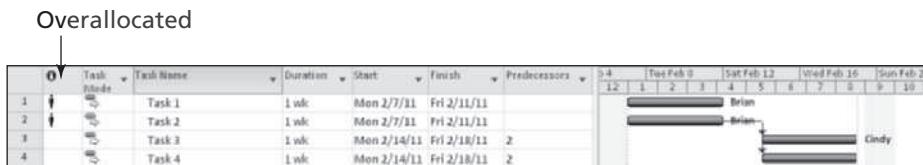


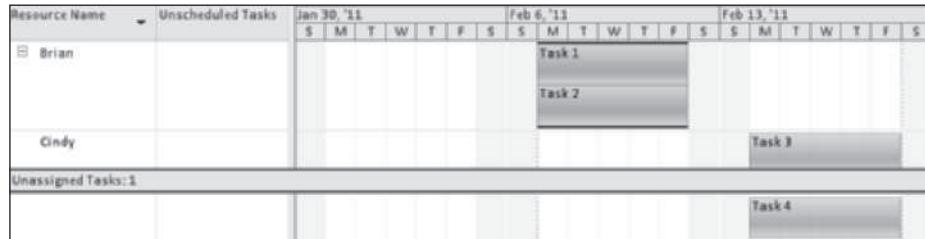
FIGURE A-62 Overallocated resource

You can click the Team Planner view under the View tab to see a screen similar to the top section of Figure A-63. Notice that Brian has both Tasks 1 and 2 assigned to him at the same time. These tasks and Brian's name display in red to show the overallocation. Cindy is assigned Task 3 the following week, and Task 4 is unassigned. By simply clicking and dragging Task 4 straight up so it is under Brian in Week 2 and dragging Task 2 straight down so it is under Cindy in Week 1, you can reassign those tasks and remove Brian's overallocation, as shown in the bottom section of Figure A-63. Many people will appreciate the simplicity of this new feature!

*From Schwalbe's *An Introduction to Project Management, Third Edition*, 2010.

A.66

Before moving tasks in the Team Planner View:



After moving tasks in the Team Planner View:

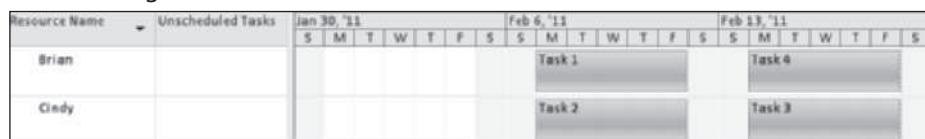


FIGURE A-63 Adjusting resource assignments using the Team Planner feature

Now that you have learned how to change resource calendars, view resource histograms, and level resources, you are ready to learn how to use Project 2010 to assist in project communications management.

PROJECT COMMUNICATIONS MANAGEMENT

Project 2010 can help you generate, collect, disseminate, store, and report project information. There are many different tables, views, reports, and formatting features to aid in project communications, as you have seen in the previous sections. This section highlights some common reports and views. It also describes how to use templates and insert hyperlinks from Project 2010 into other project documents and how to use Project 2010 in a workgroup setting.

Common Reports and Views

To use Project 2010 to enhance project communications, it is important to know when to use the many different ways to collect, view, and display project information. Table A-5 provides a brief summary of Project 2010 features and their functions, which will help you understand when to use which feature. Examples of most of these features are provided as figures in this appendix.

You can see from Table A-5 that many different reports are available in Project 2010. The overview reports provide summary information that top management might want to see, such as a project summary or a report of milestone tasks. Current activities reports help project managers stay abreast of and control project activities. The reports of unstated tasks and slipping tasks alert project managers to problem areas. Cost reports provide information related to the cash flow for the project, budget information, overbudget items, and earned value management.

TABLE A-5 Functions of Project 2010 Features

Feature	Function
Gantt Chart view, Entry table	Enter basic task information
Network Diagram view	View task dependencies and critical path graphically
Schedule table	View schedule information in a tabular form
Cost table	Enter fixed costs or view cost information
Resource Sheet view	Enter resource information
Resource Information and Gantt Chart split view	Assign resources to tasks
Team Planner	Help remove resource overallocations
Set Baseline	Save project baseline plan
Earned Value table	View earned value information
Resource Graph	View resource allocation
Resource Usage	View detailed resource usage
Resource Leveling	Level resources
Overview Reports	View project summary, top-level tasks, critical tasks, milestones, working days
Current Activities Reports	View unstarted tasks, tasks starting soon, tasks in progress, completed tasks, should-have-started tasks, slipping tasks
Cost Reports	View cash flow, budget, overbudget tasks, overbudget resources, earned value
Assignment Reports	View who does what, who does what when, to-do list, overallocated resources
Workload Reports	View task usage, resource usage
Custom Reports	Allow customization of each type of report
Insert Hyperlink	Insert hyperlinks to other files or Web sites

Assignment reports help the entire project team by providing different views of who is doing what on a project. You can see who is overallocated by running the Overallocated Resources report or by viewing the two workload reports. You can also create custom reports based on any project information you have entered into Project 2010.

Using Templates and Inserting Hyperlinks and Comments

This text provides examples of many templates that you can use to improve project communications. Because it is often difficult to create good project files, many organizations keep a repository of template or sample files. As shown earlier in this appendix, Project 2010 includes several template files, and you can also access several templates online. You must load the template files when installing Project 2010 or access templates via the Internet.

To access the Project 2010 templates:

1. *Access Project 2010 templates.* Start Project 2010, if necessary, click the File tab, and then click New to display the Available Templates, as shown in Figure A-64.



FIGURE A-64 Opening templates

2. *Access templates from Office.com.* Click the **Schedules** icon in the Office.com Templates section at the bottom of the screen, as shown in Figure A-65. A list of templates available at the time appears. Experiment with finding and using various template files in Project 2010.

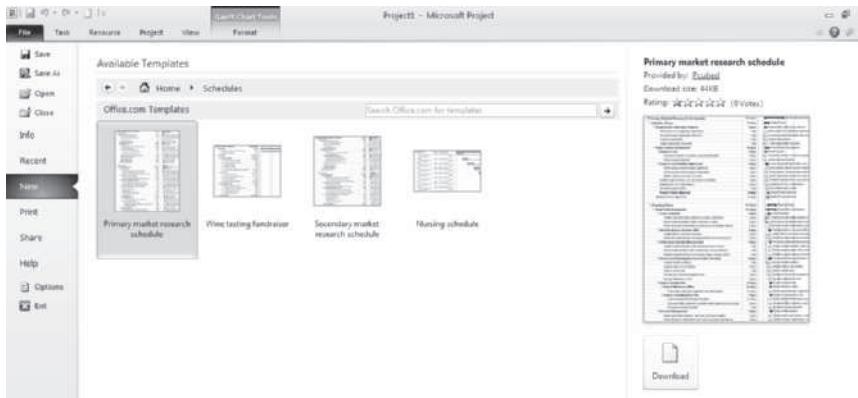


FIGURE A-65 Schedules templates from Office.com

Using templates can help you prepare your project files, but be careful to address the unique needs of your project and organization. For example, even though the Home Move template file can provide guidance in preparing a Project 2010 file for a specific home move project, you need to tailor the file for your particular situation and schedule. You can also create your own Project 2010 templates by saving your file as a template using the Save As option from the File menu. Simply change the Save As Type option to Template. Project 2010 then gives the file an .mpt extension (Microsoft Project Template) to identify the file as a template.

In addition to using templates for Project 2010 files, it is helpful to use templates for other project documents and insert hyperlinks to them from Project 2010. For example, your organization might have templates for meeting agendas, project charters, status reports, and project management plans. See the companion Web site for examples of other template files. Next, you will create hyperlinks to some template files created in other applications.

To insert a hyperlink within a Project 2010 file:

1. *Display the Entry table.* Open the **baseline.mpp** file. The Entry table and Gantt Chart view should display.
2. *Select the task in which you want to insert a hyperlink.* Under Task Name, click **Kickoff meeting**, the task name for Task 2.
3. *Open the Insert Hyperlink dialog box.* Right-click the task name, and then click **Hyperlink**. The Insert Hyperlink dialog box opens, as shown in Figure A-66.

A.70

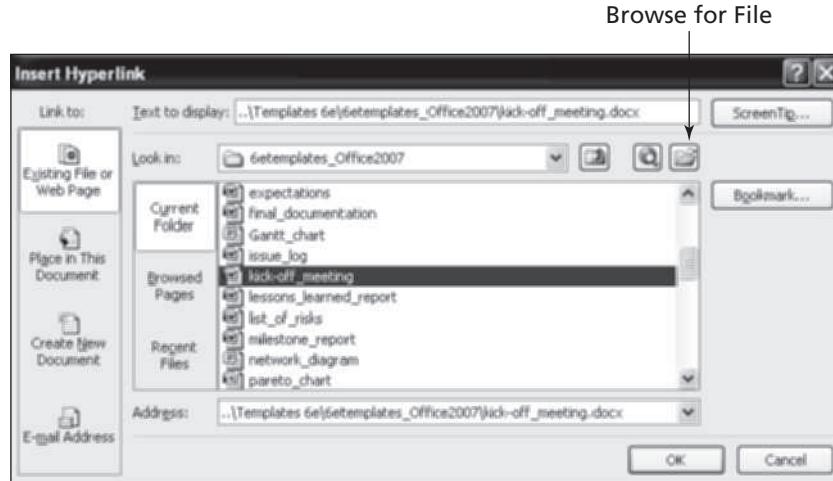


FIGURE A-66 Insert Hyperlink dialog box

4. Enter the filename of the hyperlink file. Click the **Browse for File** button to browse for the kickoffmeeting.doc file you downloaded earlier. Double-click **kickoffmeeting.doc**, and then click **OK**.
5. Review the Indicators column. A Hyperlink icon appears in the Indicators column to the left of the Task Name for Task 2, next to the Overallocation icon. Move your mouse over the hyperlink icon until the mouse pointer changes to the Hand symbol to reveal the name of the hyperlinked file.

Clicking the Hyperlink button in the Indicators column or right-clicking, pointing to Hyperlink, and selecting Open will automatically open the hyperlinked file. Using hyperlinks is a good way to keep all project documents organized.

It is also a good idea to insert notes or comments into Project 2010 files to provide more information on specific tasks.

To insert a note for Task 4:

1. Open the Task Information dialog box for Task 4. Under Task Name, double-click **Charter signed**, the task name for Task 4. Click the Notes tab.
2. Enter your note text. Type **The charter was developed as a joint effort.** in the Notes text box, as shown in Figure A-67.

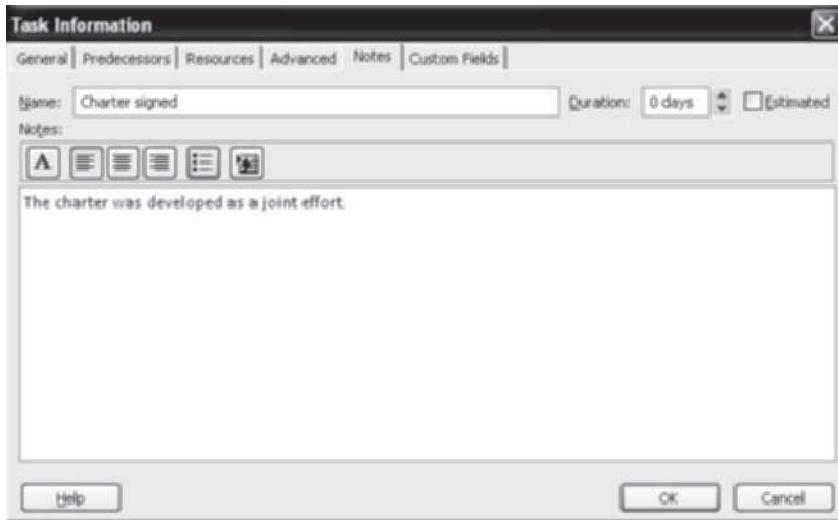


FIGURE A-67 Task Information dialog box Notes tab

3. *See the resulting Notes icon.* Click **OK** to enter the note. The Notes icon appears in the Indicators column next to Task 4.
4. *Open the note.* Double-click the Notes icon in the Indicators column for Task 4 to view the note, and then click **OK**.
5. *Close the file without saving it.* Click **Close**, and then click **No** when you are prompted to save the file.

As you can see, Project 2010 is a very powerful tool. If used properly, it can greatly help users successfully manage projects.

DISCUSSION QUESTIONS

1. What are some new features of Project 2010, and how do they differ from previous versions of Microsoft Project?
2. How do you use Project 2010 to create a WBS hierarchy?
3. Summarize how you use Project 2010 to assist in time management. How do you enter durations, link tasks, and view critical path information?
4. How can Project 2010 assist you in project cost management? What table view would you use to enter fixed costs? How do you enter resources and assign them to tasks? How can you view earned value information?
5. Briefly describe how to change resource calendars, view resource histograms, and level resources. How can you use the new Team Planner feature?
6. Summarize ways to communicate information with Project 2010. How do you link to other files from within your Project 2010 file? How can you find and use templates?

EXERCISES

The more you practice using the features of Project 2010, the more quickly you will master the application and use it to manage projects. This section includes an exercise that you can do as a series of two homework assignments to make sure you understand the steps and concepts in this appendix. There are also exercises based on three examples of information technology projects that could benefit from using Project 2010 to assist in project scope, time, cost, human resource, and communications management. This section also includes an exercise you can use to apply Project 2010 on a real project. Simpler exercises that use Project 2010 are at the end of several chapters in this text.

Exercise A-1: Homework Assignments

You can go through this appendix as a series of homework assignments. The following two assignments are used by the author of this text in her classes. Instructors can easily change which items to print out or modify instructions to make this assignment more unique.

HW1: Project 2010, Part 1 (100 points, 25 points for each item)

See points for each item listed below. Note that you can download a free trial of Project 2010 from www.microsoft.com or use the PCs at school. Remember that you must be running Windows 7, Vista, or XP. Read and follow the hands-on instructions in this Guide to Using Project 2010. Read the first several pages of the appendix, do all the steps starting under the Overview of Project 2010 heading, and stop after you finish the steps right before the heading called Baseline Plan, Actual Costs, and Actual Times. The files mentioned are on the companion Web site and the author's site (www.kathyschwalbe.com under Book FAQs on the left). In the section on Project Scope Management, Table A-2 lists the first task as Initiating. After the word Initiating, enter your first and last name (e.g., Initiating – Kathy Schwalbe). Continue doing all of the steps, and print out only the items described below.

1. Your formatted Gantt chart, Figure A-33. Be sure it fits on one page before printing and that all the columns shown are visible.
2. The Schedule Table view, Figure A-36.
3. The Split screen view for entering resource information, Figure A-43. *Note:* Press the print screen key (PrtScrn [or PrtScrn and Fn] on your keyboard) and paste it into Word to print because it does not print out as shown from within Project 2010.
4. Create a new Project file that shows the WBS for a generic project. Make the main categories project management, concept, development, implementation, and close-out. Include at least four tasks and one milestone under each of these main categories. Enter 0 for the duration of the milestones, but do not enter any durations for the other tasks. Be sure to indent tasks and show the outline numbers before printing out the Gantt Chart view on one page.

HW2: Project 2010, Part 2 (100 points, 25 points for each item)

Do all the steps starting under the Baseline Plan, Actual Costs, and Actual Times heading through the end of the appendix. Remember to type your first and last name after the first task, Initiating.

1. Print out the Tracking Gantt Chart view, Figure A-53.
2. Print out the Resource Graph view showing an overallocation, Figure A-59.
3. Create your own file using the information in Figures A-62 and 63 to experiment with the Team Planner. Print out screen shots of both figures by copying and pasting them into a word processing software.
4. Write a one- to two-page, single-spaced paper summarizing what you think about Microsoft Project. What do you like and dislike about it? Do you think it would be useful for managing all projects, or just some? Which ones?

Exercise A-2: Web Site Development

A nonprofit organization would like you to lead a Web site development project. The organization has Internet access that includes space on a Web server, but no experience developing Web sites. In addition to creating its Web site, the organization would like you to train two people on its staff to do simple Web page updates. The Web site should include the following information, as a minimum: description of the organization (mission, history, and recent events), list of services, and contact information. The organization wants the Web site to include graphics (photographs and other images) and have an attractive, easy-to-use layout.

1. *Project Scope Management*

Create a WBS for this project and enter the tasks in Project 2010. Create milestones and summary tasks. Assume that the main WBS categories and some of the project management tasks are similar to tasks from the Project Tracking Database project.

Some of the specific analysis, design, and implementation tasks will be to:

- a. Collect information on the organization in hardcopy and digital form (brochures, reports, organization charts, photographs, and so on).
- b. Research Web sites of similar organizations.
- c. Collect detailed information about the customer's design preferences and access to space on a Web server.

- d. Develop a template for the customer to review (background color for all pages, position of navigation buttons, layout of text and images, typography, including basic text font and display type, and so on).
 - e. Create a site map or hierarchy chart showing the flow of Web pages.
 - f. Digitize the photographs and find other images for the Web pages; digitize hard-copy text.
 - g. Create the individual Web pages for the site.
 - h. Test the pages and the site.
 - i. Implement the Web site on the customer's Web server.
 - j. Get customer feedback.
 - k. Incorporate changes.
 - l. Create training materials for the customer on how to update the Web pages.
 - m. Train the customer's staff on updating the Web pages.
2. *Project Time Management*
 - a. Enter realistic durations for each task, and then link the tasks as appropriate. Be sure that all tasks are linked (in some fashion) to the start and end of the project. Assume that you have four months to complete the entire project. *Hint:* Use the Project Tracking Database as an example.
 - b. Print the Gantt Chart view and Network Diagram view for the project.
 - c. Print the Schedule table to see key dates and slack times for each task.
 3. *Project Cost Management*
 - a. Assume that you have three people working on the project and each of them would charge \$20 per hour. Enter this information in the Resource Sheet.
 - b. Estimate that each person will spend an average of about five hours per week for the four-month period. Assign resources to the tasks, and try to make the final cost in line with this estimate.
 - c. Print the budget report for your project.
 4. *Project Human Resource Management*
 - a. Assume that one project team member will be unavailable (due to vacation) for two weeks in the middle of the project. Make adjustments to accommodate this vacation so that the schedule does not slip and the costs do not change. Document the changes from the original plan and the new plan.
 - b. Use the Resource Usage view to see each person's work each month. Print a copy of the Resource Usage view.
 5. *Project Communications Management*
 - a. Adjust the timescale on your Gantt chart to enable the chart to fit on one page. Then paste a copy of the Gantt chart in PowerPoint. You can use your Print Screen button to copy the image and paste it into PowerPoint. Also add key milestones to the Timeline and copy it into a second PowerPoint slide. Copy and print out both slides in PowerPoint on the page.
 - b. Print a "To-do List" report for each team member.
 - c. Create a "Who Does What Report" and print it out.

Exercise A-3: Software Training Program

ABC Company has 50,000 employees and wants to increase employee productivity by setting up an internal software applications training program. The training program will teach

employees how to use Microsoft software programs such as Vista, Word 2010, Excel 2010, PowerPoint 2010, Access 2010, and Project 2010. Courses will be offered in the evenings and on Saturdays and taught by qualified volunteer employees. Instructors will be paid \$40 per hour. In the past, employees were sent to courses offered by local vendors during company time. In contrast, this internal training program should save the company money on training as well as make people more productive. The Human Resources department will manage the program, and any employee can take the courses. Employees will receive a certificate for completing courses, and a copy will be put in their personnel files. The company is not sure which vendor's off-the-shelf training materials to use. The company needs to set up a training classroom, survey employees on desired courses, find qualified volunteer instructors, and start offering courses. The company wants to offer the first courses within six months. One person from Human Resources is assigned full time to manage this project, and top management has pledged its support.

1. *Project Scope Management*

Create a WBS for this project and enter the tasks in Project 2010. Create milestones and summary tasks. Assume that some of the project management tasks you need to do are similar to tasks from the Project Tracking Database example. Some of the tasks specific to this project will be to:

- a. Review off-the-shelf training materials from three major vendors and decide which materials to use.
- b. Negotiate a contract with the selected vendor for its materials.
- c. Develop communications information about this new training program. Disseminate the information via department meetings, e-mail, the company's intranet, and flyers to all employees.
- d. Create a survey to determine the number and type of courses needed and employees' preferred times for taking courses.
- e. Administer the survey.
- f. Solicit qualified volunteers to teach the courses.
- g. Review resumes, interview candidates for teaching the courses, and develop a list of preferred instructors.
- h. Coordinate with the Facilities department to build two classrooms with 20 personal computers each, a teacher station, and an overhead projection system (assume that Facilities will manage this part of the project).
- i. Schedule courses.
- j. Develop a fair system for signing up for classes.
- k. Develop a course evaluation form to assess the usefulness of each course and the instructor's teaching ability.
- l. Offer classes.

2. *Project Time Management*

- a. Enter realistic durations for each task and then link appropriate tasks. Be sure that all tasks are linked in some fashion to the start and end of the project. Use the Project Tracking Database as an example. Assume that you have six months to complete the entire project.
- b. Print the Gantt Chart view and Network Diagram view for the project.
- c. Print the Schedule table to see key dates and slack times for each task.

3. *Project Cost Management*
 - a. Assume that you have four people from various departments available part time to support the full-time Human Resources person, Terry, on the project. Assume that Terry's hourly rate is \$40. Two people from the Information Technology department will each spend up to 25% of their time supporting the project. Their hourly rate is \$50. One person from the Marketing department is available 25% of the time at \$40 per hour, and one person from Corporate is available 30% of the time at \$35 per hour. Enter this information about time and hourly wages into the Resource Sheet. Assume that the cost to build the two classrooms will be \$100,000, and enter it as a fixed cost.
 - b. Using your best judgment, assign resources to the tasks.
 - c. View the Resource Graphs for each person. If anyone is overallocated, make adjustments.
 - d. Print the budget report for the project.
4. *Project Human Resource Management*
 - a. Assume that the Marketing person will be unavailable for one week, two months into the project, and for another week, four months into the project. Make adjustments to accommodate this unavailability so the schedule does not slip and costs do not change. Document the changes from the original plan and the new plan.
 - b. Add to each resource a 5% raise that starts three months into the project. Print a new budget report.
 - c. Use the Resource Usage view to see each person's work each month. Print a copy.
5. *Project Communications Management*
 - a. Adjust the timescale on your Gantt chart to enable the chart to fit on one page. Then paste a copy of the Gantt chart in PowerPoint. You can use your Print Screen button to copy the image and paste it into PowerPoint. Also add key milestones to the Timeline and copy it into a second PowerPoint slide. Copy and print out both slides in PowerPoint on one page.
 - b. Print a "To-do List" report for each team member.
 - c. Review some of the other reports, and print out one that you think would help in managing the project.

Exercise A-4: Project Tracking Database

Expand the Project Tracking Database example. Assume that XYZ Company wants to create a history of project information, and the Project Tracking Database example is the best format for this type of history. The company wants to track information on 20 past and current projects and wants the database to be able to handle 100 projects total. The company wants to track the following project information:

- Project name
- Sponsor name
- Sponsor department
- Type of project

- Project description
- Project manager
- Team members
- Date project was proposed
- Date project was approved or denied
- Initial cost estimate
- Initial time estimate
- Dates of milestones (e.g., project approval, funding approval, project completion)
- Actual cost
- Actual time
- Location of project files

1. *Project Scope Management*

Open scope.mpp and add more detail to Executing tasks, using the information in Table A-6.

TABLE A-6 Company XYZ Project Tracking Database executing tasks

Analysis Tasks	Design Tasks	Implementation Tasks
Collect list of 20 projects	Gather detailed requirements for desired outputs from the database	Enter project data
Gather information on projects	Create fully attributed, normalized data model	Test database
Define draft requirements	Create list of edit rules for fields, determine default values, develop queries, and determine formats for reports	Make adjustments, as needed
Create entity relationship diagram for database	Develop list of queries required for database	Conduct user testing
Create sample entry screen	Review design information with customer	Make adjustments based on user testing
Create sample report	Make adjustments to design based on customer feedback	Create online Help, user manual, and other documentation
Develop simple prototype of database	Create full table structure in database prototype	Train users on the system

(continued)

TABLE A-6 Company XYZ Project Tracking Database executing tasks (*continued*)

Analysis Tasks	Design Tasks	Implementation Tasks
Review prototype with customer	Create data input screens	
Make adjustments based on customer feedback	Write queries	
	Create reports	
	Create main screen	
	Review new prototype with customer	

2. *Project Time Management*

- a. Enter realistic durations for each task, and then link appropriate tasks. Make the additional tasks fit the time estimate: 20 days for analysis tasks, 30 days for design tasks, and 20 days for implementation tasks. Assume that all of the executing tasks have a total duration of 70 days. Do not overlap analysis, design, and implementation tasks.
- b. Print the Gantt Chart view and Network Diagram view for the project.
- c. Print the Schedule table to see key dates and slack times for each task.

3. *Project Cost Management*

- a. Use the resource and cost information provided in resource.mpp.
- b. Assign resources to the new tasks. Try to make the final cost about the same as that shown in the Project Tracking Database example: about \$50,000.
- c. Print the budget report for the project.

4. *Project Human Resources Management*

- a. Two months after the project begins, give everyone on the team a 10% raise. Document the increase in costs that these raises cause.
- b. Use the Resource Usage view to see each person's work each month. Print a copy of the Resource Usage view.

5. *Project Communications Management*

- a. Adjust the timescale on your Gantt chart to enable the chart to fit on one page. Then paste a copy of the Gantt chart in PowerPoint. You can use your Print Screen button to copy the image and paste it into PowerPoint. Also add key milestones to the Timeline and copy it into a second PowerPoint slide. Copy and print out both slides in PowerPoint on one page.
- b. Print a "Top-Level Tasks" report.
- c. Review some of the other reports, and print out one that you think would help in managing the project.

Exercise A-5: Real Project Application

If you are doing a group project as part of your class or for a project at work, use Project 2010 to create a detailed file describing the work you plan to do. Enter a sufficient WBS, estimate task durations, link tasks, enter milestones, enter resources and costs, assign resources, and so on. Save your file as a baseline and track your progress. View earned value information when you are halfway through the project or course. Continue tracking your progress until the project or course is finished. Print your Gantt chart, Resource Sheet, Project Summary report, and relevant information. Write a two- to three-page report describing your experience. What did you learn about Project 2010 from this exercise? What did you learn about managing a project? How do you think Project 2010 helps in managing a project? You may also want to interview people who use Project 2010 for their experiences and suggestions.



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APPENDIX B

ADVICE FOR THE PROJECT MANAGEMENT PROFESSIONAL (PMP) EXAM AND RELATED CERTIFICATIONS

INTRODUCTION TO PROJECT MANAGEMENT CERTIFICATION PROGRAMS

This appendix provides information on project management certification programs and offers advice for earning certifications. It briefly describes various certification programs and provides detailed information on PMI's PMP and CompTIA's Project+ certifications, the structure and content of these exams, suggestions on preparing for the exams, tips for taking the exams, sample questions, and information on related certifications.

WHAT IS PMP CERTIFICATION?

The Project Management Institute (PMI) offers certification as a Project Management Professional (PMP). As mentioned in Chapter 1, the number of people earning PMP certification grew rapidly in the past ten years. There are PMPs in more than 120 countries throughout the world. Detailed information about PMP certification, the PMP Certification Handbook, and an online application is available from PMI's Web site (www.pmi.org) under Career Development. The following information is quoted from PMI's Web site:

“The Project Management Institute (PMI®) is the world’s leading association for the project management profession. It administers a globally recognized, rigorous, education, and/or professional experience and examination-based professional credentialing program that maintains an ISO 9001 certification in Quality Management Systems. To get the latest information, please visit the breaking news section.

B.2

Earning a professional credential through PMI means that one has:

- Demonstrated the appropriate education and/or professional experience;
- Passed a rigorous examination;
- Agreed to abide by a professional code of conduct;
- Committed to maintaining their active credential through meeting continuing certification requirements.

PMI professional credentials—available to members of the Institute and non-members alike—are widely recognized and accepted throughout the world as evidence of a proven level of education, knowledge and experience in project management.”¹

Many companies and organizations are recommending or even requiring PMP certification for their project managers. A February 2003 newsletter reported that Microsoft chose PMI’s PMP Certification Program as the certification of choice for its Microsoft Services Operation. Microsoft chose the PMP certification because of its global recognition and proven record in professional development for project managers.² *CertCities.com* ranked the PMP as No. 4 in their ten hottest certifications for 2006. It “made a strong showing this year, rising from its debut spot at No. 10 last year, thanks in part to even stronger buzz for this industry-neutral title within the IT community.”³

Certification Magazine published its annual review of how certification affects salaries of information technology professionals. This industry-wide study uses real-world numbers to show how education and experience affect a person’s bottom-line salary. During a down market, people might ask why they should seek additional technical certifications. According to Gary Gabelhouse of *Certification Magazine*, “Perhaps it is best expressed in two words: job security. In boom times, one constantly reviews the rate of growth in salary as a key personal-success measurement. However, in down times, job security is paramount.”⁴

The October 2004 issue of *PM Network* included an article entitled “The Rise of PMP,” which provided several examples of companies and countries that have made concerted efforts to increase their number of PMPs. Hewlett-Packard had only six registered PMPs in 1997, but by August 2004, it had more than 1,500 and was adding 500 per year. Although most PMPs are in the United States (51,498) and Canada (7,444), the PMP credential is growing in popularity in several countries, such as Japan (6,001), China (4,472), and India (2,281). Thomas Walenta, PMP, a senior project manager for IBM Germany, said, “The PMP credential lends portability to a career plan. It has significantly shaped careers in the IT industry, with global companies creating career models for project managers based on PMI certification requirements.”⁵

As of January 2009, PMI also offers certifications as a Certified Associate in Project Management (CAPM), a PMI-Scheduling Professional (PMI-SP), a PMI-Risk Management Professional (PMI-RMP), and a Program Management Professional (PgMP). PMI developed the CAPM certification as a stepping-stone to PMP certification. Candidates for the CAPM certification must also meet specific education and experience requirements and pass an exam. As you can imagine, the requirements are not as rigorous as they are for the PMP exam. You might want to consider getting the CAPM, or just wait until you have enough experience to earn the more popular PMP certification. PMI reported only 6,729 active CAPMs by the end of December 2008 and 318,289 active PMPs.⁶ As described on the following page, you need 4,500 hours of project experience or a minimum of three years if you have a bachelor’s degree to qualify for PMP certification.

Appendix B

What Are the Requirements for Earning and Maintaining PMP Certification?

B.3

You can now apply to take the PMP exam online. You can also fill out the application forms and mail them in with a check, if desired. *Before you apply to take the exam, you must meet the following four requirements:*

1. Have experience working in the field of project management. When you apply to take the exam, you enter the role you played in leading and directing project tasks on one or several projects and how many hours you worked in each of the five project management process groups for each project. Roles include:
 - Project contributor
 - Supervisor
 - Manager
 - Project leader
 - Project manager
 - Educator
 - Consultant
 - Administrator
 - Other

Note that you do not have to have experience as a project manager to take the PMP exam—any of these roles will suffice. PMP certification requires all applicants with a bachelor’s degree to have a minimum of three years of unique, nonoverlapping project management experience where at least 4,500 hours are spent leading and directing project tasks. Applicants without a bachelor’s degree are required to have a minimum of five years of unique, non-overlapping project management experience where at least 7,500 hours were spent leading and directing project tasks. In both cases, the experience must be accrued within eight years of the date of application. You must fill out a simple form online (or by paper, if you choose not to apply online) listing the title of a project or projects you worked on; the start and end date for when you worked on the project(s); your role on the project; the number of hours you spent in leading and directing tasks related to the initiating, planning, executing, controlling, and closing processes; and a summary of the project tasks that you led and directed on the project. You must list some hours in each of the five process groups, but not for each project, if you worked on multiple projects. PMI staff will review your qualifications and let you know if you are qualified to take the PMP exam. *You cannot take the exam without this experience qualification.*

2. Document at least 35 contact hours of project management education. A contact hour is defined as one hour of participation in an educational activity. There is no time frame for this requirement. A university or college, a training company or independent consultant, a PMI chapter, a PMI Registered Education Provider (REP), a company-sponsored program, or a distance-learning company can provide the education. The hours must include content on project quality, scope, time, cost, human resources, communications, risk, procurement, and integration management. You must list the course title, institution, date, and number of hours for each course. For example, if you took

- a “principles of management” course at a university 20 years ago, you could list that on the education form along with a one- or two-day PMP exam preparation class.
3. Agree to the PMP certificant and candidate agreement and release statement. This form certifies that application information is accurate and complete and that candidates will conduct themselves in accordance with the Code of Ethics and Professional Conduct, professional development requirements, and other PMI certification program policies and procedures. You can simply check a box saying you agree to this information when applying online. Note that PMI randomly audits 10–15 percent of applications, so be prepared to provide more detailed information as requested if audited, such as college transcripts, signatures of supervisors or managers to verify experience, etc.
 4. Pay the appropriate exam fee. As of January 2009, the PMP certification fee was \$405 for PMI members and \$555 for non-members. The re-examination fee (if you don’t pass the exam) is \$275 for PMI members and \$375 for non-members. The annual individual PMI membership fee is \$129 (including the \$10 application fee). Note that students, or anyone enrolled in a degree-granting program at an accredited, or globally equivalent, college or university, can join PMI at the student member rate of only \$40 (including the \$10 application fee). If you want to earn your PMP certification, it makes sense to join PMI, not only for the financial savings, but also for other benefits. Consult PMI’s Web site for membership information.

The last step in earning PMP certification is passing the exam! After PMI sends you an eligibility letter to take the PMP exam, you can sign up to take it at several different testing sites. You must take the exam within one year of receiving your eligibility letter. The eligibility letter will include complete details for scheduling your exam. As of January 2009, the PMP exam consisted of 200 four-option multiple-choice questions, and 25 of those questions are considered pretest questions that do not affect your score. The pretest questions are randomly placed throughout the exam and are used to test the validity of future examination questions. Although you cannot use any study aids during the exam, you can bring a nonprogrammable calculator to assist in performing calculations required to answer some of the questions. You are also given two blank pieces of paper, so you can write down formulas or other information when you enter the exam room, but you cannot bring in any notes or other materials. The questions on each test are randomly selected from a large test bank, so each person taking the exam receives different questions. The exam is preceded by a 15-minute computer tutorial to familiarize you with the mechanics of taking the exam. Test takers have four hours to take this computerized exam, and a passing score is 60.5 percent, or at least 106 correct answers out of the 175 scored questions, as of January 2009. PMI reviews and revises the exam annually. *Be sure you consult PMI’s Web site for any notices about changes to the PMP exam.* For example, the passing percentage was changed several times to achieve PMI’s goal of having around 75 percent of people pass the exam. PMI uses the Modified Angoff Technique, a certification industry practice standard, to determine the passing score.

PMI offers a professional development program for maintaining the PMP certification. To maintain your PMP status, you must earn at least 60 Professional Development Units within three years, pay a recertification fee every three years when you renew your

certification (\$60 as of January 2009), and agree to continue to adhere to PMI's Code of Ethics and Professional Conduct. The Continuing Certification Requirements Handbook, available from PMI's Web site, provides more details on maintaining your PMP status.

B.5

What Is the Structure and Content of the PMP Exam?

The PMP exam is based on information from the entire project management body of knowledge as well as the area of professional responsibility. Essentially, the exam reviews concepts and terminology in PMI's *PMBOK® Guide*, and texts such as this one will help to reinforce your understanding of key topics in project management. Table B-1 shows the approximate breakdown of questions on the PMP exam by process group as of January 2009. Candidates should review updated exam information on PMI's Web site to make sure they are using the latest information. Remember that this text is based on the *PMBOK® Guide, Fourth Edition*. The PMP exam will be based on the fourth edition starting July 1, 2009. There were not that many changes from the Third Edition, but make sure you study the correct edition for your exam. PMI also provides sample exam questions from their site as well. See a link to this site and other sites with free sample questions on the companion Web site.

TABLE B-1 Breakdown of questions on the PMP exam by process groups

Process Group	Percent of Questions on PMP Exam	Number of Questions on PMP Exam (out of 200)
Initiating	11	22
Planning	23	46
Executing	27	54
Monitoring and Controlling	21	42
Closing	9	18
Professional Responsibility	9	18

Study Table 3-1 from Chapter 3 of this text to understand the relationships among project management process groups, activities, and knowledge areas. Table 3-1 briefly outlines which activities are performed during each of the project management process groups and what is involved in each of the knowledge areas. It is also important to understand what each of the project management activities includes. Several questions on the certification exam require an understanding of this framework for project management, and many questions require an understanding of the various tools and techniques described in the *PMBOK® Guide, Fourth Edition* and this text.

The PMP exam includes three basic types of questions:

1. *Conceptual questions* test your understanding of key terms and concepts in project management. For example, you should know basic definitions such as what a project is, what project management is, and what key activities are included in project scope management.

2. *Application questions* test your ability to apply techniques to specific problems. For example, a question might provide information for constructing a network diagram and ask you to find the critical path or determine how much slack is available on another path. You might be given cost and schedule information and be asked to find the schedule or cost performance index by applying earned value formulas.
3. *Evaluative questions* provide situations or scenarios for you to analyze, and your response will indicate how you would handle them. For example, a project might have many problems. A question might ask what you would do in that situation, given the information provided. Remember that all questions are multiple-choice, so you must select the best answer from the options provided.

How Should You Prepare for the PMP Exam?

To prepare for the PMP exam, it is important to understand *your* learning and testing style, and to use whatever resources and study techniques work best for *you*. Below are some important questions to consider:

- *Are you a good test taker?* Some people are very good at studying and do well on multiple-choice exams, but others are not. If you have not taken a long multiple-choice test in a while, it may take you longer to prepare for the exam than others.
- *How confident do you need to be before taking the exam?* To pass the exam, you need to answer only 60.5 percent of the questions correctly. Your PMP certificate will not display your final score, so it does not matter if you get 61, 70, 80, 90, or even 100 percent correct.
- *How much information do you need to review before taking the exam?* The *PMBOK® Guide, Fourth Edition* and this text should be enough content information, but many people want to review even more information before taking the PMP exam. Several companies sell books, sample tests, CD-ROMs, and audiotapes, or provide courses designed to help people pass the PMP exam. There's even a *PMP Certification for Dummies* book available with a CD-ROM of sample questions. See the Suggested Readings section of the companion Web site for a list of suggested resources, many at no cost at all, such as www.pmstudy.com and www.bestsamplequestions.com.
- *How much time and money do you want to spend studying for the PMP exam?* Some people with little free time or money to spend on extra courses or materials would rather just take the PMP exam with little preparation; this will tell them what they need to study further if they don't pass on their first attempt. Even though there is a reexamination fee of \$275 (for PMI members), this cost is generally less than what you would have to pay for most exam preparation courses. Spend the time and money you need to feel confident enough to pass the exam, but don't overextend yourself.
- *Do you know PMI's language?* Even if you think you know about project management, studying the material in the *PMBOK® Guide, Fourth Edition* before taking the exam will help you. Volunteer PMPs created the exam, and they often refer to information from the *PMBOK® Guide, Fourth Edition* when

writing questions. Many outstanding project managers might fail the exam if they don't use PMI's terminology or processes in their jobs.

- *Do you really understand the triple constraint of project management?* Many questions on the PMP exam are based on the scope, time, and cost knowledge areas. You should be familiar with project charters, WBSs, network diagrams, critical path analysis, cost estimates, earned value, and so on before you take the exam.
- *Do you want to meet other people in the field of project management as you study for your PMP exam?* Several chapters of PMI offer PMP exam review courses. These courses are often a good way to network with other local project managers or soon to be project managers. Many other organizations provide online and instructor-led courses in PMP preparation where you can also meet people in the field. Several organizations also provide their own in-house study groups as a means to network as well as pass the PMP exam.
- *Do you need extra support, peer pressure, or incentives to pass the PMP exam?* Having some support and positive peer pressure might help to ensure that you actually take and pass the exam in a timely manner. If you don't want to be part of a study group, even just telling a friend, colleague, or loved one that you have set a goal to pass the PMP exam by a certain date might provide motivation to actually do it. You could also reward yourself after you pass the exam.
- *How much are you willing to invest in getting PMP certification?* If you have the time and money, you could take one of the immersion courses several companies offer, like Cheetah Learning, Velociteach, Project Management Training Institute, or mScholar. These courses generally last four to five days and cost from \$2,000 to \$3,000. The company offering the course will have you come to class with your qualification to take the PMP exam already completed, and you actually take the PMP exam on the fourth or fifth day of the class. If you don't pass, many training companies will let you take the class again at no additional cost. If you don't have any extra money to spend, you can find several free resources (see the companion Web site) and join or form your own study group, or just go take the exam and see how you do. However, try not to over study for the exam; if you know the material well and are passing practice exams, trust yourself and your skills. If you need to take it a second time to pass, just do so.

Ten Tips for Taking the PMP Exam

1. The PMP exam is computer based and begins with a short tutorial on how to use the testing software. The software makes it easy to mark questions you want to review later, so learning how to mark questions is helpful. Using this feature can give you a feel for how well you are doing on the test. It is a good idea to go through every question somewhat quickly and mark those questions on which you want to spend more time. If you mark 79 questions or less (the total number you can miss to get 60.5 percent on all 200 questions), you should

pass the exam. Remember that 25 of the questions are not scored, and you need 60.5 percent correct on the 175 scored questions.

2. The time allotted for the exam is four hours, and each multiple-choice question has four answer choices. You should have plenty of time to complete the exam. Use the first two to three hours to go through all of the questions. Do not spend too much time on any one question. As you work, mark each question that you would like to return to for further consideration. Then use the remaining time to check the questions you are not sure of. If you're a morning person, schedule your exam in the morning. If you work better after lunch, schedule an afternoon exam. Make sure you are alert and well rested when you go in to take the exam.
3. Some people believe it is better to change answers you are unsure about. If you think that a different answer is better, after reading the question again, then change your answer. Don't get hung up on any questions. Move on and focus on answering the questions you can answer correctly.
4. Do not try to read more into the questions than what is stated. There are no trick questions, but some may be poorly worded or just bad questions. Remember that they were written by volunteers and are part of a huge test bank. Most of the questions are relatively short, and there are only four options from which to choose the answer.
5. To increase your chances of getting the right answer, first eliminate obviously wrong options, and then choose among the remaining options. Take the time to read all of the options before selecting an answer. Remember, you have to pick the *best* answer available.
6. Some questions require doing calculations such as earned value management. It is worthwhile to memorize the earned value formulas to make answering these questions easier. You may use a nonprogrammable calculator while taking the exam, so be sure to bring one to make performing calculations easier.
7. You should be given two pieces of blank paper to use during the exam. You might want to bring the paper yourself to make sure it is available. Before starting the test, you should write down important equations so that you do not have to rely on your memory. When you come to a question involving calculations, write the calculations down so you can check your work for errors. See Table B-2 for a summary of formulas you should know for the PMP exam.
8. Read all questions carefully. A few sections of the test require that you answer three to four questions about a scenario. These questions can be difficult; it can seem as if two of the choices could be correct, although you can choose only one. Read the directions for these types of questions several times to be sure you know exactly what you are supposed to do. Also, remember important concepts such as the importance of using a WBS, emphasizing teamwork, and practicing professional integrity. You might want to skip the longer or more difficult questions and answer the shorter or easier ones first.
9. If you do not know an answer and need to guess, be wary of choices that include words such as always, never, only, must, and completely. These extreme words usually indicate incorrect answers because there are many exceptions to rules.

10. After an hour or two, take a short break to clear your mind. You might want to bring a snack to have during your break. You might also consider bringing earplugs if you're easily distracted by noises in the room.

B.9

TABLE B-2 Formulas to know for the PMP exam**Time-Related Formulas**

Assume $o = 6$, $m = 21$, and $p = 36$ for the following examples, where o = optimistic, m = most likely, and p = pessimistic estimate

PERT weighted average = $(o + 4m + p)/6$

Example: PERT weighted average = $(36 + 4(21) + 6)/6 = 21$

PERT standard deviation = $(p - o)/6$

Example: PERT standard deviation = $(36 - 6)/6 = 5$

Range of outcomes using 1 std. dev. = $21 - 5 = 16$ days and $21 + 5 = 26$ days.

Range of outcomes using 2 std. dev. = $21 - 10 = 11$ days and $21 + 10 = 31$ days.

Range of outcomes using 3 std. dev. = $21 - 15 = 6$ days and $21 + 15 = 36$ days.

1 std dev. = **68.3%** of the population

2 std dev. = **95.5%** of the population

3 std dev. = **99.7%** of the population

Cost/Earned Value Formulas

Earned Value = EV

Actual Cost = AC

Planned Value = PV

Cost Variance = CV = EV - AC

Schedule Variance = SV = EV - PV

Cost Performance Index = CPI = EV/AC

Schedule Performance Index = SPI = EV/PV

BAC = Budget At Completion or the planned total budget for the project

EAC = Estimate At Completion = BAC/CPI

Estimated time at completion = estimated time/SPI

Estimate To Complete (ETC) = EAC - AC

(continued)

TABLE B-2 Formulas to know for the PMP exam (*continued*)**B.10**

Variance At Completion (VAC) = BAC – EAC

Remember, a negative value for a variance or equivalently an index less than 100 percent means over budget/behind schedule.

Communications Formulas

Number of communications channels = $(n(n - 1))/2$

Example: Assume $n = 5$, where n = number of people

Number of communications channels = $(5(5 - 1))/2 = (5 * 4)/2 = 10$

Procurement Formulas

Point of Total Assumption (PTA) = (Ceiling Price – Target Price)/Government Share + Target Cost

Make or Buy Analysis: Create a formula so the “make” option equals the “buy” or “lease” option, and then solve for the number of days.

Example: Assume you can purchase equipment for \$3,000 and it costs \$100/day to operate OR you can lease the equipment for \$400/day. In how many days is the lease price equal to the purchase price? Set up an equation where the cost to lease or buy the item is equal to the cost to purchase or make the item.

1. Let d = the number of days you'll use the equipment: $\$400d = \$3,000 + \$100d$
2. Then solve for d . Subtract $\$100d$ from both sides to get $\$300d = \$3,000$
3. Then divide each side by $\$300$ to get $d = 10$

Therefore, if you need the equipment for more than 10 days, it would be cheaper to buy it.

Sample PMP Exam Questions

A few sample questions similar to those you will find on the PMP exam are provided on the following pages. You can check your answers at the end of this appendix. If you miss seven or less out of these 20 questions, you are probably ready to take the PMP exam. You can find additional sample questions and their answers on the companion Web site, as well as links to other free sample tests from various Web sites.

1. A document that formally recognizes the existence of a project is a _____.
 - a. Gantt chart
 - b. WBS
 - c. project charter
 - d. scope statement
2. Decomposition is used in developing _____.
 - a. the management plan
 - b. the communications plan
 - c. the earned value
 - d. the WBS

3. The critical path on a project represents _____.
 - a. the shortest path through a network diagram
 - b. the longest path through a network diagram
 - c. the most important tasks on a project
 - d. the highest-risk tasks on a project
4. If the earned value (EV) for a project is \$30,000, the actual cost (AC) is \$33,000, and the planned value (PV) is \$25,000, what is the cost variance?
 - a. \$3,000
 - b. -\$3,000
 - c. \$5,000
 - d. -\$5,000
5. If the earned value (EV) for a project is \$30,000, the actual cost (AC) is \$33,000, and the planned value (PV) is \$25,000, how is the project performing?
 - a. The project is over budget and ahead of schedule.
 - b. The project is over budget and behind schedule.
 - c. The project is under budget and ahead of schedule.
 - d. The project is under budget and behind schedule.
6. What is the target goal for defects per million opportunities using Six Sigma?
 - a. 1
 - b. 3.4
 - c. 34
 - d. 100
7. Project human resource management does not include which of the following processes?
 - a. acquiring the project team
 - b. developing the project team
 - c. managing the project team
 - d. estimating activity resources
8. If a project team goes from three to five people, how many more communications channels are there?
 - a. 7
 - b. 6
 - c. 5
 - d. 4
9. Your project team has identified several risks related to your project. You decide to take actions to reduce the impact of a particular risk event by reducing the probability of its occurrence. What risk response strategy are you using?
 - a. risk avoidance
 - b. risk acceptance
 - c. risk mitigation
 - d. contingency planning
10. Which type of contract provides the least amount of risk for the buyer?
 - a. firm fixed price
 - b. fixed price incentive
 - c. cost plus incentive fee
 - d. cost plus fixed fee

11. Suppose you have a project with four tasks as follows:
- Task 1 can start immediately and has an estimated duration of 1.
 - Task 2 can start after Task 1 is completed and has an estimated duration of 4.
 - Task 3 can start after Task 2 is completed and has an estimated duration of 5.
 - Task 4 can start after Task 1 is completed and must be completed when Task 3 is completed. Its estimated duration is 8.

What is the length of the critical path for this project?

- a. 9
- b. 10
- c. 11
- d. 12

12. In which project management process group is the most time and money typically spent?

- a. initiating
- b. planning
- c. executing
- d. monitoring and controlling

13. Creating a probability/impact matrix is part of which risk management process?

- a. plan risk management
- b. identify risks
- c. perform qualitative risk analysis
- d. perform quantitative risk analysis

14. It is crucial that your project team finish your project on time. Your team is using a technique to account for limited resources. You have also added a project buffer before the end date and feeding buffers before each critical task.

What technique are you using?

- a. critical path analysis
- b. PERT
- c. critical chain scheduling
- d. earned value management

15. One of your senior technical specialists informs you that a major design flaw exists in a systems development project you are managing. You are already testing the system and planned to roll it out to more than 5,000 users in a month. You know that changing the design now will cause several cost and schedule overruns. As project manager, what should you do first?

- a. Issue a stop work order until you understand the extent of the flaw.
- b. Notify your project sponsor immediately to see if there are additional funds available to work on this problem.
- c. Notify your senior management and let them decide what to do.
- d. Hold a meeting as soon as possible with key members of your project team to discuss possible solutions to the problem.

16. You are a member of a large government project. You know that the contract insists that all equipment be manufactured in the United States. You see a senior member of your team replacing a company etching on a piece of equipment that was made in a foreign country. You confront this person, and he says he is following the project manager's orders. What should you do?
 - a. Nothing; the project manager made the decision.
 - b. Immediately report the violation to the government.
 - c. Update your resume and look for another job.
 - d. Talk to the project manager about the situation, and then decide what to do.
17. Which of the following is not an output of the integrated change control process?
 - a. project management plan updates
 - b. change request status updates
 - c. forecasts
 - d. project document updates
18. The ceiling price for a contract is \$1.25 million, the target price is \$1.1 million, the target cost is \$1 million, and the government share is 75%. What is the point of total assumption?
 - a. \$1.2 million
 - b. \$1 million
 - c. \$1.1 million
 - d. there is not enough information
19. Obtaining quotes, bids, offers, or proposals is part of which project procurement management process?
 - a. plan procurements
 - b. conduct procurements
 - c. administer procurements
 - d. close procurements
20. Your boss believes that all of your project team members avoid work as much as possible. He or she often uses threats and various control schemes to make sure people are doing their jobs. Which approach to managing people does your boss follow?
 - a. Maslow's hierarchy of needs
 - b. Theory X
 - c. Theory Y
 - d. Herzberg's motivation and hygiene factors

WHAT IS PROJECT+ CERTIFICATION?

The Computing Technology Industry Association (CompTIA) is the world's largest developer of vendor-neutral IT certification exams. By January 2009, more than one million people worldwide have earned CompTIA certifications in topics such as PC service, networking, security, and Radio Frequency Identification (RFID). In April 2001, CompTIA started offering its IT Project+ certification, which was purchased from Prometric-Thomson Learning,

and recognized as the Gartner Institute Certification Program. The certification was renamed Project+ in August 2004. According to CompTIA's manager of public relations, there are more than 11,000 people with CompTIA's Project+ certification by the end of 2008. Detailed information about Project+ certification is available from CompTIA's Web site (www.comptia.org) under certification. The following information is quoted from CompTIA's Web site in January 2009:

CompTIA Project+ is a globally recognized project management certification that provides validation of fundamental project management skills. It covers the entire project life cycle from initiation and planning through execution, acceptance, support and closure. Unlike some project management certifications, CompTIA Project+ can be acquired in a quick and cost-effective manner. There are no prerequisites, and candidates are not required to submit an application or complete additional hours of continuing education. CompTIA Project+ gives project managers the skills necessary to complete projects on time and within budget, and creates a common project management language among project team members.⁷

What Are the Requirements for Earning and Maintaining Project + Certification?

You can register to take the Project+ exam online from CompTIA's Web site. Testing sites include Thomson Prometric and Pearson VUE. Unlike the PMP exam, there are very few requirements you need to meet to take the Project+ exam. CompTIA does not require that you have any work experience or formal education in project management before you can take the Project+ exam, but they do recommend 2,000 hours of work experience. The main requirements include paying a fee and passing the exam. Important information is summarized below:

1. As of January 2009, the cost for taking the Project+ exam is \$239 for non-members in the United States.
2. To pass this 90-minute, 80-question exam, you must score at least 63 percent.
3. You do not need to renew your Project+ certification.
4. Project+ certification is one of the prerequisites or equivalents to Novell's Certified Novell Engineer (CNE), Certified Novell Administrator (CNA), and Certified Novell Instructor (CNI) certifications. CompTIA's Project+ certification is also a Continuing Certification Requirement (CCR) to maintaining a Master CNE certification.
5. You can earn college credit with the Project+ certification. For example, CompTIA's Web site says that Capella University will provide six credit hours to someone with the Project+ certification. Many colleges and universities will grant credit based on your experience or other certifications. There is usually some fee involved, but it's often much less than the cost of taking the courses.

Additional Information on the Project+ Exam

Because there are no experience or education requirements for taking the Project+ exam, you might want to take it very early in your career. Once you have enough experience and education to take the PMP exam, you might want to earn and maintain PMP certification.

As stated already, the Project+ exam consists of 80 questions. Table B-3 shows the approximate breakdown of questions on the Project+ exam by four domain areas. Candidates should review updated exam information on CompTIA's Web site to make sure they are prepared for the exams. For example, CompTIA provides a detailed list of objectives you should understand before taking the Project+ exam. Studying information in this book will also help you prepare for the Project+ exam. You might also want to purchase an exam guide to get specific information and access to more sample questions.

TABLE B-3 Breakdown of questions on the Project+ exam by domain areas

Domain Area	Percent of Questions on Project+ Exam
Project Initiation and Scope Definition	20
Project Planning	30
Project Execution, Control, and, Coordination	43
Project Closure, Acceptance, and Support	7

Much of the advice for taking the PMP exam also applies to taking the Project+ exam. Many people find the questions to be similar on both exams, although the PMP exam is longer and more comprehensive. Below are some of the main differences between the content and types of questions you will find on the Project+ exam:

- The Project+ exam includes some scenarios and content specific to the information technology industry. For example, you should understand the various systems development life cycles and issues that often occur on information technology projects.
- You should understand the various roles of people on information technology projects, such as business analysts, database analysts, programmers, and so on.
- Although many of the questions are multiple-choice like the PMP exam questions, several questions involve choosing two or more correct answers. Several questions also involve matching or putting items in order, called drag-and-drop questions.
- The Project+ exam is not based on the *PMBOK® Guide*, so you do not need to know the processes involved in the various knowledge areas. However, much of the terminology, concepts, tools, and techniques are the same on both exams.

Sample Project+ Exam Questions

A few sample questions similar to those you will find on the Project+ exam are provided below. CompTIA also provides sample questions on their Web site at http://certification.comptia.org/resources/practice_test.aspx. You can check your answers at the end of this appendix.

1. Two software developers on your project disagree on how to design an important part of a system. There are several technologies and methodologies they could use. What should be the primary driver in deciding how to proceed?
 - a. following corporate standards
 - b. following industry standards
 - c. meeting business needs
 - d. using the lowest-cost approach
2. Match the following items to their descriptions:

Stakeholder	a. Acts as a liaison between the business area and developers
Project manager	b. Writes software code
Business analyst	c. Person involved in or affected by project activities
Programmer	d. Responsible for managing project activities
3. For a project to be successful, the project manager should strive to understand and meet certain goals. What are the three main project goals to meet? Select three answers.
 - a. scope or performance goals
 - b. time goals
 - c. political goals
 - d. cost goals
 - e. stock price goals
4. You have received an incomplete project scope definition. Put the following actions in order of how you should proceed to complete them.
 - a. Incorporate additional changes to the scope definition document.
 - b. Review the draft scope definition document with your project team.
 - c. Get signatures on the completed scope definition document.
 - d. Rewrite the draft scope definition document with your users and project team.
5. What term is used to describe the process of reaching agreement on a collective decision?
 - a. collaboration
 - b. cooperation
 - c. coordination
 - d. consensus
6. What is a variance?
 - a. a buffer in a duration estimate
 - b. a small amount of money set aside for contingencies
 - c. a form of risk management
 - d. a deviation from the project plan

7. Which of the following would be legitimate reasons for a vendor to request a delay in delivering a product? Select two answers.
- The vendor may have underestimated the amount of time required to produce and deliver the product.
 - The project contact from the vendor's organization may be going on vacation.
 - The vendor might be able to provide a better product by delivering the product late.
 - The vendor might lose money by delivering the product late.
8. When should you involve stakeholders in the change control process on information technology projects?
- before a change is submitted
 - after a change is submitted
 - when a change is submitted
 - throughout the life of a project
9. Which of the following techniques can be used to help manage requirements? Select three answers.
- prototyping
 - use case modeling
 - JAD
 - worst case modeling
10. Match the following items to their descriptions:
- | | |
|------------------|--|
| Lessons learned | a. Leave a clear and complete history of a project |
| Project audits | b. Review project progress and results |
| Project archives | c. Document what went right or wrong on a project |

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WHAT OTHER EXAMS OR CERTIFICATIONS RELATED TO PROJECT MANAGEMENT ARE AVAILABLE?

In recent years, several organizations have been developing more certifications related to project management and information technology project management, in particular. Some involve taking exams while others require coursework or attendance at workshops. Below are brief descriptions of other existing exams or certifications related to project management:

- Microsoft provides certification as a Microsoft Office Specialist (MOS) to recognize proficiency in using its software products. In October 2006, Microsoft Learning launched a new Microsoft Office Project 2007 Certification program. You can become a Microsoft Certified Technology Specialist (MCTS) in either Managing Projects with Microsoft Office Project 2007 or Enterprise Project Management with Microsoft Office Project Server 2007. You can also earn a Microsoft Certified IT Professional (MCITP) in enterprise Project Management with Microsoft Office Project Server 2007. Its purpose is "to help advance project management as a profession and maximize value for its customer base of

nearly 20 million Microsoft Office Project user licenses.⁷⁸ Microsoft is using the PMI's *PMBOK® Guide* as a foundation for supporting specific Project 2007 competencies. See Microsoft's Web site (www.microsoft.com) for more details.

- The International Project Management Association (IPMA) offers a four-level certification program. The main requirements for each level are derived from typical activities, responsibilities, and requirements from practice. The IPMA four-level certification system, in descending order, includes the Certified Project Director, Certified Senior Project Manager, Certified Project Manager, and Certified Project Management Associate. More than 50,000 people worldwide had earned IPMA certifications, according to IPMA's Web site in January 2007. See www.ipma.ch for more details.
- Certified IT Project Manager (CITPM): In 1998, the Singapore Computer Society collaborated with the Infocomm Development Authority of Singapore to establish an Information Technology Project Management Certification Program. PMI signed a Memorandum of Understanding with the Singapore Computer Society to support and advance the global credentialing of project management and information technology expertise. In January 2007, the Singapore Computer Society's Web site listed three levels of the CITPM Certification: CITPM (Senior), CITPM, and CITPM (Associate). For more details consult their Web site (www.scs.org.sg/about_certprog.php).
- PMI's additional certifications. As mentioned earlier, as of January 2009, PMI also offers certification as a Certified Associate in Project Management (CAPM), a PMI-Scheduling Professional (PMI-SP), a PMI-Risk Management Professional (PMI-RMP), and a Program Management Professional (PgMP). Check PMI's Web site for updated information on their certification programs.
- Many colleges, universities, and corporate training companies now provide their own certificate programs or entire degrees in project management. Typing "project management certificate" into www.google.com in January 2009 resulted in 58,400 hits. Some of the certificate courses apply toward bachelor's or advanced degrees, while many do not. Like any other educational program, it is important to research the quality of the program and find one that will meet your specific needs. The December 2006 issue of the Project Management Institute's *PMI Today* included a supplement that said they had identified over 284 project management degree programs at 235 institutions worldwide. See the author's Web site for a summary of more than 120 U.S. graduate programs created as part of a class project in 2006 (www.kathyschwalbe.com, under Project Management Info). Also see sites like www.gradschools.com to find more information on graduate programs in project management throughout the world.

Discussion Questions

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1. What is PMP certification, and why do you think the number of people earning it has grown so much in the past 10 years?
2. What do you need to do before you can take the PMP exam? What is the exam itself like? What do you need to do to maintain PMP certification? What do you need to do to take the Project+ exam? How does the Project+ exam differ from the PMP exam? Do you need to renew Project+ certification?
3. What is the difference between conceptual, application, and evaluative questions? Which project management process groups have the most questions on the PMP exam? What are the four domain areas tested on the Project+ exam?
4. Which tips for taking the PMP exam do you think would be most helpful for you?
5. If you plan to take the Project+ or PMP exam soon, what should you do to prepare?
6. Briefly describe project management certification programs other than the PMP or Project+ certifications.

Exercises

1. Go to PMI's Web site and review the information about taking the PMP exam. Write a two-page paper summarizing what you found.
2. Go to CompTIA's Web site and review the information about taking the Project+ exam. Write a two-page paper summarizing what you found.
3. Answer the 20 sample PMP questions in this text or take another sample test, and then score your results. Summarize how you did and areas you would need to study before you could take the PMP exam.
4. Interview someone who has PMP or Project+ certification. Ask him or her why he or she earned the certification and how it has affected his or her career. Write your findings in a two-page paper.
5. Do an Internet search on earning PMP or Project+ certification. Be sure to search for Yahoo! groups or similar sites related to these topics. What are some of the options you found to help people prepare for either exam? If you were to take one of the exams, what do you think you would do to help study for it? Do you think you would need additional information beyond what is in this text to help you pass? Write a two-page paper describing your findings and opinions.
6. Read a recent issue of PMI's *PM Network* magazine. You can access a free sample copy from PMI's Web site. Summarize all of the ads you find in the magazine related to earning PMP or other project management related certification in a two-page paper. Also, include your opinion on which ad, course, book, CD-ROM, or other media appeals to you the most.

Answers to Sample PMP Exam Questions

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- | | |
|-------|-------|
| 1. c | 11. b |
| 2. d | 12. c |
| 3. b | 13. c |
| 4. b | 14. c |
| 5. a | 15. d |
| 6. b | 16. d |
| 7. d | 17. c |
| 8. a | 18. a |
| 9. c | 19. b |
| 10. a | 20. b |

Answers to Sample Project+ Exam Questions

- | | |
|---------------|-------------|
| 1. c | 6. d |
| 2. c, d, a, b | 7. a, c |
| 3. a, b, d | 8. d |
| 4. b, d, a, c | 9. a, b, c |
| 5. d | 10. c, b, a |

End Notes

- ¹ Project Management Institute, "PMI® Certification Programs," (www.pmi.org/) (January 2007).
- ² Project Management Institute Information Systems Specific Interest Group (ISSIG), *ISSIG Bits* (www.pmi-issig.org) (February 2003).
- ³ Becky Nagel, "CertCities.com's 10 Hottest Certifications for 2006," *CertCities.com*, (December 14, 2005).
- ⁴ Global Knowledge, "2003 Certification Salary by Certmag," *Global Knowledge E-Newsletter*, Issue #56 (March 2003).
- ⁵ Adrienne Rewi, "The Rise of PMP," *PM Network*, (October 2004), p. 18.
- ⁶ The Project Management Institute, "PMI Today," (February 2009).
- ⁷ CompTIA Web site (<http://certification.comptia.org/project>) (January 2009).
- ⁸ Microsoft, "Microsoft Advances Its Project Management Technology and the Project Management Profession," Microsoft PressPass (October 20, 2006).

APPENDIX C

ADDITIONAL RUNNING CASES AND SIMULATION SOFTWARE

INTRODUCTION

This appendix provides two additional running cases as well as information about using simulation software. The first case includes tasks ordered by each of the nine knowledge areas discussed in Chapters 4 through 12 of this text. The second case includes tasks based on the five project management process groups. There is also information about using Fissure's project management simulation software. Additional running cases, including the Video Game Delivery Project case that was in the fifth edition of this text, and suggestions for finding more cases or having students do real projects are available on the companion Web site.

The purpose of these cases is to help you practice and develop the project management skills learned from this text. Several of the tasks involve using templates provided on the companion Web site (www.cengage.com/mis/schwalbe) and the author's personal Web site (www.kathyschwalbe.com). Instructors can download the suggested solutions for these cases from the password-protected section on Course Technology's Web site. Contact a sales rep at www.cengage.com/coursetechnology.

ADDITIONAL CASE 1: GREEN COMPUTING RESEARCH PROJECT

Part 1: Project Integration Management

You are working for We Are Big, Inc., an international firm with over 100, 000 employees located in several different countries. A strategic goal is to help improve the environment while increasing revenues and reducing costs. The Environmental Technologies Program just started, and the VP of Operations, Natalie, is the program sponsor. Ito is the program manager, and there is a steering committee made up of ten senior executives, including

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Natalie, overseeing the program. There are several projects underneath this program, one being the Green Computing Research Project. The CIO and project sponsor, Ben, has given this project high priority and plans to hold special interviews to hand-pick the project manager and team. Ben is also a member of the program steering committee. Before coming to We Are Big, Inc., Ben sponsored a project at a large computer firm to improve data center efficiency. This project, however, is much broader than that one was. The main purpose of the Green Computing Research Project is to research possible applications of green computing including:

- Data center and overall energy efficiency
- The disposal of electronic waste and recycling
- Telecommuting
- Virtualization of server resources
- Thin client solutions
- Use of open source software, and
- Development of new software to address green computing for internal use and potential sale to other organizations

The budget for the project was \$500, 000, and the goal was to provide an extensive report, including detailed financial analysis and recommendations on what green computing technologies to implement. Official project request forms for the recommended solutions would also be created as part of the project.

Ben decided to have a small group of people, five to be exact, dedicated to working on this six-month project full-time and to call on people in other areas on an as-needed basis. He wanted to personally be involved in selecting the project manager and have that person help him to select the rest of the project team. Ben wanted to find people already working inside the company, but he was also open to reviewing applications for potential new employees to work specifically on this project as long as they could start quickly. Since many good people were located in different parts of the world, Ben thought it made sense to select the best people he could find and allow them to work virtually on the project. Ben also wanted the project manager to do more than just manage the project. He or she would also do some of the research, writing, editing, and the like required to produce the desired results. He was also open to paying expert consultants for their advice and purchasing books and related articles, as needed.

Tasks

1. Research green computing and projects that have been done or are being done by large organizations such as IBM, Dell, HP, and Google. See www.greener-computing.com and similar sites provided on the companion Web site or that you find yourself. Include your definition of green computing to include all of the topics listed in the background scenario. Describe each of these areas of green computing, including a detailed example of how at least one organization has implemented each one, and investigate the return on investment. Summarize your results in a two- to three-page paper, citing at least three references.
2. Prepare a weighted decision matrix using the template from the companion Web site (`wtd_decision_matrix.xls`) for Ben to use to evaluate people applying to be the project manager for this important project. Develop at least five

criteria, assign weights to each criterion, assign scores, and then calculate the weighted scores for four fictitious people. Print the spreadsheet and bar chart with the results. Write a one-page paper describing this weighted decision matrix and summarize the results.

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3. Prepare the financial section of a business case for the Green Computing Research Project. Assume this project will take six months to complete (done in Year 0) and cost \$500,000, and costs to implement some of the technologies would be \$2,000,000 for year one and \$600,000 for years two and three. Estimated benefits are \$500,000 the first year after implementation and \$2.5 million the following two years. Use the business case spreadsheet template from the companion Web site (*business_case_financials.xls*) to help calculate the NPV, ROI, and the year in which payback occurs. Assume a 7 percent discount rate, but make sure it is an input that is easy to change.
 4. Prepare a project charter for the Green Computing Research Project. Assume the project will take six months to complete and the budget is \$500,000. Use the project charter template (*charter.doc*) and examples of project charters in Chapters 3 and 4 as guidelines. Assume that part of the approach is to select the project team as quickly as possible.
 5. Since people will request changes to the project, you want to make sure you have a good integrated change control process in place. You will also want to address change requests as quickly as possible. Review the template for a change request form provided on the companion Web site (*change_request.doc*). Write a two-page paper describing how you plan to manage changes on this project in a timely manner. Address who will be involved in making change control decisions, what paperwork or electronic systems will be used to collect and respond to changes, and other related issues.

Part 2: Project Scope Management

Congratulations! You have been selected as the project manager for the Green Computing Research Project. The company's CIO, Ben, is the project sponsor, and Ito is the program manager for the larger Environmental Technologies Program that this project is part of. Now you need to put together your project team and get to work on this high-visibility project. You will work with Ben to hand-pick your team. Ben had already worked with the HR department to advertise these openings internally as well as outside the company. Ben had also used his personal contacts to let people know about this important project. In addition, you are encouraged to use outside consultants and other resources, as appropriate. Initial estimates suggest that about \$300,000 budgeted for this project will go to internal staffing and the rest to outside sources. The main products you'll produce will be a series of research reports—one for each green computing technology listed earlier plus one final report including all data—plus formal project proposals for at least four recommendations for implementing some of these technologies. Ben also suggested that the team come up with at least 20 different project ideas and then recommend the top four based on extensive analysis. Ben thought some type of decision support model would make sense to help collect and analyze the project ideas. You are expected to tap into resources available from the Environmental Technologies Program, but you will need to include some of those resources in your project

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budget. Ben mentioned that he knew there had already been some research done on increasing the use of telecommuting. Ben also showed you examples of what he considered to be good research reports. You notice that his examples are very professional, with a lot of charts and references, and most are 20–30 pages long, single-spaced. Ben has also shown you examples of good formal project proposals for We Are Big, Inc., and you are surprised to see how detailed they are, as well. They often reference other research and include a detailed business case.

Tasks

1. Document requirements for your project so far, including a requirements traceability matrix. Use the template provided (reqs_matrix.xls). Also include a list of questions you would like to ask the sponsor about the scope.
2. Develop a scope statement for the project using the template provided (scope_statement.doc). Be as specific as possible in describing product characteristics and deliverables. Make assumptions as needed, assuming you got answers to the questions you had in Task 1.
3. Develop a work breakdown structure (WBS) for the project. Break down the work to level 3 or level 4, as appropriate. Use the template on the companion Web site (wbs.doc) and samples in the text as guides. Print the WBS in list form as a Word file. Be sure to base your WBS on the project scope statement, stakeholder requirements, and other relevant information. Remember to include the work involved in selecting the rest of your project team and outside resources as well as coordinating with the Environmental Technologies Program. Use the project management process groups as level 2 WBS items or include project management as a level 2 WBS item to make sure you include work related to managing the project.
4. Use the WBS you developed in Task 3 above to create a Gantt chart for the project in Microsoft Project 2007. Use the outline numbering feature to display the outline numbers (click Tools on the menu bar, click Options, and then click Show outline number). Do not enter any durations or dependencies. Print the resulting Gantt chart on one page, being sure to display the entire Task Name column.

Part 3: Project Time Management

As project manager, you are actively leading the Green Computing Research Project team in developing a schedule. You and Ben found three internal people and one new hire to fill the positions on the project team as follows:

- Matt was a senior technical specialist in the corporate IT department located in the building next to yours and Ben's. He is an expert in collaboration technologies and volunteers in his community helping to organize ways for residents to dispose of computers, printers, and cell phones.
- Teresa was a senior systems analyst in the IT department in a city 500 miles away from your office. She just finished an analysis of virtualization of server resources for her office, which has responsibility for the company's data center.

- James was a senior consultant in the strategic research department in a city 1,000 miles away from your office. He has a great reputation as being a font of knowledge and excellent presenter. Although he is over 60, he has a lot of energy.
- Le was a new hire and former colleague of Ben's. She was working in Malaysia, but she planned to move to your location, starting work about four weeks after the project started. Le has a lot of theoretical knowledge in green computing, and her doctoral thesis was on that topic.

While waiting for everyone to start working on your project, you talked to several people working on other projects under the Environmental Technologies Program and did some research on green computing. You can use a fair amount of the work already done on telecommuting, and you have the name of a consulting firm to help with that part of your project, if needed. Ito and Ben both suggested that you get up to speed on available collaboration tools since much of your project work will be done virtually. They knew that Matt would be a tremendous asset for your team in that area. You have also contacted other IT staff to get detailed information on your company's needs and plans in other areas of green computing. You also found out that there is a big program meeting in England next month that you and one or two of your team members should attend. It is a three-day meeting, plus travel. Recall that the Green Computing Research Project is expected to be completed in six months, and you and your four team members are assigned full-time to this project. Your project sponsor, Ben, has made it clear that delivering a good product is most important, but he also thinks you should have no problem meeting your schedule goal. He can authorize additional funds, if needed. You have decided to hire a part-time editor/consultant, Deb, whom you know from a past job to help your team produce the final reports and project proposals. Your team has agreed to add a one-week buffer at the end of the project to ensure that you finish on time or early.

Tasks

1. Review the WBS and Gantt chart you created for Tasks 3 and 4 in Part 2. Propose three to five additional activities you think should be added to help you estimate resources and durations. Write a one-page paper describing these new activities.
2. Identify at least four milestones for this project. Write a one-page paper describing each milestone using the SMART criteria.
3. Using the Gantt chart created for Task 4 in Part 2, and the new activities and milestones you proposed in Tasks 1 and 2 above, estimate the task durations and enter dependencies as appropriate. Remember that your schedule goal for the project is six months. Print the Gantt chart and network diagram.
4. Write a one-page paper summarizing how you would assign people to each activity. Include a table or matrix listing how many hours each person would work on each task. These resource assignments should make sense given the duration estimates made in Task 3 above.
5. Assume that your project team starts falling behind schedule. In several cases, it is difficult to find detailed information on some of the green computing technologies, especially financial data. You know that it is important to meet

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or beat the six-month schedule goal, but quality is most important. Describe contingency strategies for making up lost time and avoiding schedule slips in the future.

Part 4: Project Cost Management

Your project sponsor has asked you and your team to refine the existing cost estimate for the project so that there is a solid cost baseline for evaluating project performance. Recall that your schedule and cost goals are to complete the project in six months or less for under \$500, 000. Initial estimates suggested that about \$300,000 for this project would go toward internal labor. You mistakenly thought that travel costs would be included in that \$300,000, but now you realize that it is a separate cost item. The one trip to England early in the project cost \$6,000, which you had not expected.

Tasks

1. Prepare and print a one-page cost estimate for the project, similar to the one provided in Chapter 7. Use the WBS categories you created earlier, and be sure to document assumptions you make in preparing the cost estimate. Assume a burdened labor rate of \$100/hour for the project manager, \$90 for Teresa, James, and Le, and \$80/hour for Matt. Assume about \$200/hour for outsourced labor.
2. Using the cost estimate you created in task 1, prepare a cost baseline by allocating the costs by WBS for each month of the project.
3. Assume you have completed three months of the project and have actual data. The BAC was \$500,000 for this six-month project. Also assume the following:

$$PV = \$160,000$$

$$EV = \$150,000$$

$$AC = \$180,000$$



Using this information, write a short report that answers the following questions.

- a. What is the cost variance, schedule variance, cost performance index (CPI), and schedule performance index (SPI) for the project?
- b. Use the CPI to calculate the estimate at completion (EAC) for this project. Use the SPI to estimate how long it will take to finish this project. Sketch an earned value chart using the above information, including the EAC point. See Figure 7-6 as a guide. Write a paragraph explaining what this chart shows.
- c. How is the project doing? Is it ahead of schedule or behind schedule? Is it under budget or over budget? Should you alert your sponsor or other senior management and ask for assistance?
4. You notice that several of the tasks that involve getting inputs from consultants outside of your own company have cost more and taken longer to complete than planned. You have talked to the consultants several times, but they say they are doing the best they can. You also underestimated travel costs for this project. Write a one-page paper describing corrective action you could take to address these problems.

Part 5: Project Quality Management

The Green Computing Research Project team is working hard to ensure their work meets expectations. The team has a detailed project scope statement, schedule, and so on, but as the project manager, you want to make sure you'll satisfy key stakeholders, especially Ben, the project sponsor, and Ito, the program manager. You have seen how tough Ito can be on project managers after listening to his critiques of other project managers at the monthly program review meeting. He was adamant on having solid research and financial analysis and liked to see people use technology to make quick what-if projections. You were impressed to see that several other project teams had developed computer models to help them perform sensitivity analysis and make important decisions. Most of the models were done using Excel, which Ito preferred, and you were glad that you were an expert with Excel, as was Matt. Ito was pretty easy on you at your first monthly review because things were just getting started, but he did give you a list of items to report on next month. You had Ben there to help answer some of the tough questions, but you wanted to be able to hold your own at future monthly meetings.

Tasks

1. Develop a list of at least five quality standards or requirements related to meeting the stakeholder expectations especially for Ben and Ito. Also provide a brief description of each standard or requirement. For example, a requirement might be related to the computer model (that the computer model you create to analyze the 20 or more technologies be done in Excel 2007). Other standards or requirements might be related to the quality of the financial analysis and research you use.
2. Review the Seven Basic Tools of Quality. Pick one and make up a scenario related to this project where it would be useful. Document the scenario and tool in a one-to-two page paper.
3. Find a high quality research report related to the green computing. Summarize the report and why you think it is of high quality in a one-to-two page paper.

Part 6: Project Human Resource Management

You are five weeks into the Green Computing Research Project, and all of the full-time team members are together face-to-face for the first time. Recall that you, Ben, Matt, and Le all work in the same location, but Teresa and James are based out of town and will do most of their work virtually. Le is also new to the company and just moved to the U.S. She is currently staying in a hotel and looking for a place to live. She'd like to buy her first home, but she wants to make sure it's a good investment and somewhere she'd like to stay for at least five years. You get along very well with your project sponsor, Ben, and Matt is a great resource, even though he is extremely reserved. Le is also very quiet, and you quickly discover that she is an excellent researcher and writer, but she is not comfortable speaking in public. Teresa and James are much more talkative and are excited to be working on this project. However, James seems to be reluctant to use much technology to share ideas and really enjoys face-to-face meetings and discussions. You have made preliminary agreements with two outside consultants to assist you with editing and the teleconferencing topic for your research. You have to prepare a monthly progress report and presentation for Ito, the

program manager. You also have short meetings as needed with Ben, your sponsor, and send him a weekly progress report.

C.8

Tasks

1. Before this first face-to-face meeting, you asked everyone to send a brief introductory e-mail, including links to their personal Web sites, LinkedIn site, etc. You also asked everyone to take a short version of the Meyers-Briggs Type Indicator (MBTI) online and share their results with everyone else. Take this test yourself from www.humanmetrics.com and research how different MBTI types respond to work environments, especially for research projects and virtual teams. Summarize your findings in a one-to-two page paper. Also document what you would write in an e-mail to introduce yourself, assuming you are the project manager for this project. Be creative in your response.
2. Prepare a responsibility assignment matrix in RACI chart format based on the WBS you created earlier and the information you have on project team members and other stakeholders. Use the template (ram.xls) and samples in the text. Document key assumptions you made in preparing the chart.
3. Since everyone will be in town for most of the week, you want to make sure they develop good working relationships. You also want everyone to work together efficiently. You asked Matt to review collaboration tools he recommends the team use for this project. As Matt starts demonstrating some of these tools, including webcams and wikis, you notice that a couple of team members seem uncomfortable, especially James. He thought that he would be in charge of certain aspects of the research reports and didn't know how he'd feel about any team member being able to change what he wrote in a wiki. Le did not like the idea of using a Webcam. She'd rather not have her face on video when communicating virtually. Discuss these human resource-related concerns and others that you think would be common in this situation. Include strategies for addressing them as well.

Part 7: Project Communications Management

Several communications issues have arisen on the Green Computing Research Project. Three months have passed since the project started. Your team had agreed to post all of their work on a shared site, but a couple of team members don't seem to like using that site and prefer to use e-mails and attachments. When they do that, other team members cannot easily see what work is done in one place or provide feedback using the wiki tools. It is also clear that some team members are better researchers and writers than others. When you have weekly conference calls with the Webcams, at least a couple of people don't have the Webcam working and just use the audio. You also find that these meetings rarely end on time as some team members get very talkative. You also got grilled by Ito at the last monthly program review meeting. He thought you'd be much further along in the project than you are and expects you to have one recommendation on a green computing project that looks very promising by next month. You haven't seen any great ideas yet. You want to start having face-to-face meetings at least twice a month, but you know it will make your project go

Appendix C

over budget even more. At least the Excel model is going well. You and Matt have put a good deal of time into developing it. If only you had enough good data to put into it.

Tasks

1. Create an issue log for the project using the template provided (issue_log.doc). List at least four issues and related information based on the scenario presented.
2. Research the use of wikis and address the concerns several team members have about using them, especially their fear of having others “mess up” their work. Document your findings in a one- to two-page paper.
3. Write a two-page paper describing how you might approach two of the conflicts described above.

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Part 8: Project Risk Management

Since several problems have been occurring on the Green Computing Research Project (see the case information in Part 7), you decide to be more proactive in managing risks. You also want to address positive and negative risks.

Tasks

1. Create a risk register for the project, using the template (risk_register.xls). Identify six potential risks, including at least two positive risks.
2. Plot the six risks on a probability/impact matrix, using the template (prob_impact_matrix.ppt) and print it out. Assign a numeric value for the probability of each risk, and its impact on meeting the main project objectives. Use a scale of 1 to 10 to assign the values, with 1 being lowest and 10 being highest. For a simple risk factor calculation, multiply these two values (the probability score and the impact score). Document the results in a one-page paper, including your rationale for how you determined the scores for one of the negative risks and one of the positive risks.
3. Develop a response strategy for one of the negative risks and one of the positive risks. Enter the information in the risk register and print out your complete risk register. Also write a one-page paper describing what specific tasks would need to be done to implement these two strategies. Include time and cost estimates for each strategy.

Part 9: Project Procurement Management

After a monthly program management review meeting four months into your project, Ito and Ben approved adding \$100,000 and one additional month to the project. You provided strong rationale for the need for additional travel funds and more money for outside consultants to help you in finding good research information. You decided to have James go back to his old job since he didn’t seem open to sharing ideas with others. It would be best to have a consulting firm, one you were already using, pick up the work he was supposed to do, even though it would cost a lot more. The lead consultant, Anne, had done a great analysis of improving overall energy efficiency for the company that would save millions of dollars each year. Ben, your project sponsor, was disappointed that you couldn’t meet the original time and cost goals, but he wanted to make sure the final results were of high quality.

Tasks

1. Draft a contract to have Anne's consulting firm perform the work that James was supposed to do for this project. Assume that the contract would last for three months and that Anne herself would be working about half-time, earning \$200/hour. She would also have some other consultants do up to 100 hours of work at \$150/hour. They would do most of the work virtually, but Anne would come in town at least once a month for face-to-face meetings. Limit the contract to two or three pages, and be sure to address specific personnel and travel requirements. Also make sure that all work produced would be owned and copyrighted by your company exclusively.
2. Deb, the editor you hired for this project, has asked for your assistance in organizing the final comprehensive research report. Draft a one-page executive summary and a table of contents for this report.
3. Although this is not really a procurement task, it is provided here for convenience purposes. Prepare a lessons-learned report for what you may have learned so far as project manager for this project. Use the template provided on the companion Web site (*lessons_learned_report.doc*) and be creative in your response.

ADDITIONAL CASE 2: PROJECT MANAGEMENT VIDEOS PROJECT

Part 1: Initiating

You and several of your classmates are taking a project management class, and your instructor suggested a project to find or create good video clips to illustrate various concepts related to the class. For example, the *Oceans 11*, *12*, and *13* movies all include great planning and execution clips. *Apollo 13* provides a great example of scope management and creative problem solving when the team has to figure out how to keep the astronauts alive. *The Office* television show includes many examples of poor motivation techniques. In addition to providing the clips on DVD, you will write a summary of them, including the length and source of the clip, introductions for each clip, discussion questions that you can pose before and after each clip, and suggested answers to those questions. Your instructor has suggested that teams find or create at least two good clips per team member. If several teams in your class work on this project, you will have to coordinate with them to avoid duplicating clips and to share resources. Everything your team creates for the project should fit on one DVD that will run on your instructor's computer. The DVD will be for educational use only, so there should not be any copyright issues.

Tasks

1. To become more familiar with finding short video clips, do some preliminary research. Go to sites like youtube.com and search for videos related to project management concepts. Also search for articles related to project management in the movies, and visit sites such as imdb.com to see movie trailers. Find other

sites that have legitimate movie and television clips. Also discuss movies or television shows that you and your teammates are familiar with that could be used for this project. Write a two- to three-page paper with your findings, citing all references.

2. To become familiar with creating or editing short video clips, research how to take short segments of an existing DVD and put it on a computer. Also research the devices and software needed to create, edit, and post your own videos (such as *theFlip.com* and *youtube.com*). Summarize at least three options, including price information. Write a two- to three-page paper with your findings, citing all references.
3. Prepare a team contract for this project. Use the *team_contract.doc* template provided on the companion Web site, and review the sample in the text.
4. Prepare a draft project charter for the Project Management Videos Project. Assume the project will be completed by the last day of class, and costs will include an estimate of hours (unpaid) your team will work on this project plus the cost of any necessary hardware/software you would like for the project (such as DVDs, a camcorder, video editing software, etc.). Use the *charter.doc* template provided on the companion Web site, and review the sample in the text.
5. Prepare a draft schedule for completing all of the tasks for this project. Include columns that list each task by process group; estimated start and end dates for each task; who has the main responsibility for each task; estimated hours for each task by person; and actual hours for each task by person that you'll complete as you have the information.
6. Write a brief summary of your team's MBTI types and how they might affect your team dynamics. You can take a version of the test from www.humanmetrics.com.
7. Prepare a 10-minute presentation that summarizes results from the above initiating tasks. Assume the presentation is for a review with your class and instructor. Be sure to document notes of any feedback received during the presentation and hand in hard copies of everything you produced.

Part 2: Planning

Work with your teammates and instructor to perform several planning activities for this project.

Tasks

1. Develop a scope statement for the project. Use the *scope_statement.doc* template provided on the companion Web site, and review the sample in the text. Be as specific as possible in describing product characteristics and requirements, as well as key deliverables. Determine which video clips your team will provide and what resources you think you will need (DVDs, camcorders, etc.). Be sure to coordinate the clips with your instructor and other teams and get feedback before handing in your scope statement.
2. Develop a WBS for the project. Use the *wbs.doc* template provided on the companion Web site, and review the samples in the text. Print the WBS in list form

as a Word file. Be sure the WBS is based on the project charter, scope statement, draft schedule, and other relevant information.

3. Create a milestone list for this project, and include at least ten milestones and estimated completion dates for them. Note that your instructor should have input for several of these milestones and completion dates. Use the *milestone_report.doc* template.
4. Develop a cost estimate for the project. Estimate hours needed to complete each task (including those already completed) and the costs of any items you would like to purchase for the project. Assume a rate of \$10 per hour for all labor. Use the *cost_estimate.xls* template.
5. Use the WBS and milestone list you developed in numbers 2 and 3 above and the draft schedule you created earlier to create a Gantt chart and network diagram in Project 2007 for the project. Estimate task durations and enter dependencies, as appropriate. Print the Gantt chart and network diagram. Also update the draft schedule you created under Initiating, Task 5.
6. Create a quality checklist for ensuring that the project is completed successfully. Also define at least two quality metrics for the project.
7. Create a RACI chart for the main tasks and deliverables for the project.
8. Develop a communications management plan for the project. Use the *comm_plan.doc* template and sample provided.
9. Create a probability/impact matrix and list of prioritized risks for the project. Include at least ten risks. Use the *prob_impact_matrix.ppt* template and sample provided.
10. Prepare a ten-minute presentation that you would give to summarize results from the above planning tasks. Assume the presentation is for a review with your class and instructor. Be sure to document notes of any feedback received during the presentation and hand in hard copies of everything you produced. Plan to show one video clip along with the discussion questions to get feedback.

Part 3: Executing

Work with your teammates and instructor to perform several executing activities for this project.

Tasks

1. Find or create your video clips and put them on one DVD. Be sure it runs on your instructor's computer.
2. Write the clip summaries, introductions, discussion questions, and suggested answers to those questions.
3. Document any change requests you have during project execution and get sponsor approval, if needed.

Part 4: Monitoring and Controlling

Work with your teammates and instructor to perform several monitoring and controlling activities for this project.

Tasks

1. Review the Seven Basic Tools of Quality. Pick one of these tools and create a chart or diagram to help you solve problems you are facing. Use the available templates and samples provided. Note: There is only a template for the Pareto chart called pareto_chart.xls.
2. Create and update, as required, an issue log. Use the issue_log.doc template and sample provided.
3. As described in the last task for the initiating and planning sections, be ready to show progress you have made as part of a project review. Also be sure to document actual hours on each task in the draft schedule you first created for Task 5 under Initiating and updated for Task 5 under Planning.

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Part 5: Closing

Work with your teammates and instructor to perform several closing activities for this project.

Tasks

1. Prepare a 20-minute final project presentation to summarize the results of the project. Describe the initial project goals, planned versus actual scope, time, and cost information, challenges faced, lessons-learned, and key products produced. Be sure to list all of the clips your team found and show at least two of them along with the discussion questions.
2. Prepare a final project report. Include a cover page and detailed table of contents, getting feedback from your instructor on information required. Be sure to include all of the documents and products you have prepared as appendices.
3. Get feedback from your sponsor in the form of a customer acceptance/project completion form (see the template called client_acceptance.doc) or in some other fashion. Also get feedback from your classmates.
4. If you are comfortable doing so, send a copy of your final project report and feedback on this case to the author of this text at schwalbe@augsburg.edu.

FISSURE SIMULATION SOFTWARE

Introduction

Another way to practice your project management skills is by using simulation software. This text can be purchased so that it is bundled with Fissure's project management simulation software, or you can buy it separately at www.ichapters.com for about \$12. Search for Fissure from the site. The version provided is the correct one.

Fissure's project management simulation software is based on the SimProject Alliance Prototype project. The demo version of the simulation software includes a fairly simple, 11-week project consisting of only seven tasks and ten potential team members. Fissure estimates that it takes about three to four hours to run the demo simulation. To participate in

[Additional Running Cases and Simulation Software](#)

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this simulated project, you are expected to read about the company, project, and people available to work on this project. You plan your project and make typical project decisions each week, such as when to assign staff, when to hold meetings, and when to send staff to various training opportunities. You run your project a week at a time, analyzing your results each week, referring to your weekly reports, and making your decisions for the next week. As you run the simulation each week, you are presented with communications from people within the company, team members, or other stakeholders related to the project. You choose how to respond to these communications, and all the decisions you make impact how your project progresses. You can close the simulation at any time and save your work, if desired. You can also run the simulation as many times as you like, and the results vary based on your decisions. You can use the software for 120 days.

Instructions

NOTE

It often works best if students can do this assignment as a small team or in pairs, if possible.

Run the Fissure simulation software at least two different times. Summarize key decisions and results from each week for each run, and print out the final earned value chart as well as any other information you think is valuable. Write a two- to three-page single-spaced report summarizing what you thought about using this simulation software. Be honest, specific, and thorough in your report.



GLOSSARY

5 whys — A technique where you repeatedly ask the question “Why?” (five is a good rule of thumb) to help peel away the layers of symptoms that can lead to the root cause of a problem.

acceptance decisions — Decisions that determine if the products or services produced as part of the project will be accepted or rejected.

activity — An element of work, normally found on the WBS, that has an expected duration and cost, and expected resource requirements; also called a task.

activity attributes — Information about each activity, such as predecessors, successors, logical relationships, leads and lags, resource requirements, constraints, imposed dates, and assumptions related to the activity.

activity list — A tabulation of activities to be included on a project schedule.

activity-on-arrow (AOA) — A network diagramming technique in which activities are represented by arrows and connected at points called nodes to illustrate the sequence of activities; also called arrow diagramming method (ADM).

actual cost (AC) — The total of direct and indirect costs incurred in accomplishing work on an activity during a given period.

adaptive software development (ASD) — A software development approach used when requirements cannot be clearly expressed early in the life cycle.

agile software development — A method for software development that uses new approaches, focusing on close collaboration between programming teams and business experts.

analogous estimates — A cost estimating technique that uses the actual cost of a previous, similar project as the basis for estimating the cost of the current project, also called top-down estimates.

analogy approach — Creating a WBS by using a similar project’s WBS as a starting point.

appraisal cost — The cost of evaluating processes and their outputs to ensure that a project is error-free or within an acceptable error range.

arrow diagramming method (ADM) — A network diagramming technique in which activities are represented by arrows and connected at points called nodes to illustrate the sequence of activities; also called activity-on-arrow (AOA).

backward pass — A project network diagramming technique that determines the late start and late finish dates for each activity in a similar fashion.

balanced scorecard — A methodology that converts an organization’s value drivers to a series of defined metrics.

baseline — The original project plan plus approved changes.

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baseline dates — The planned schedule dates for activities in a Tracking Gantt chart.

benchmarking — A technique used to generate ideas for quality improvements by comparing specific project practices or product characteristics to those of other projects or products within or outside the performing organization.

best practice — An optimal way recognized by industry to achieve a stated goal or objective.

bid — Also called a tender or quote (short for quotation), a document prepared by sellers providing pricing for standard items that have been clearly defined by the buyer.

blogs — Easy to use journals on the Web that allow users to write entries, create links, and upload pictures, while readers can post comments to journal entries.

bottom-up approach — Creating a WBS by having team members identify as many specific tasks related to the project as possible and then grouping them into higher level categories.

bottom-up estimates — A cost estimating technique based on estimating individual work items and summing them to get a project total.

brainstorming — A technique by which a group attempts to generate ideas or find a solution for a specific problem by amassing ideas spontaneously and without judgment.

budget at completion (BAC) — The original total budget for a project.

budgetary estimate — A cost estimate used to allocate money into an organization's budget.

buffer — Additional time to complete a task, added to an estimate to account for various factors.

burst — When a single node is followed by two or more activities on a network diagram.

business service management (BSM) tools

— Tools that help track the execution of business process flows and expose how the state of supporting IT systems and resources is impacting end-to-end business process performance in real time.

Capability Maturity Model Integration (CMMI)

— A process improvement approach that provides organizations with the essential elements of effective processes.

capitalization rate — The rate used in discounting future cash flow; also called the discount rate or opportunity cost of capital.

cash flow — Benefits minus costs or income minus expenses.

cash flow analysis — A method for determining the estimated annual costs and benefits for a project.

cause-and-effect diagram — A diagram that traces complaints about quality problems back to the responsible production operations to help find the root cause. Also known as fishbone diagram or Ishikawa diagram.

champion — A senior manager who acts as a key proponent for a project.

change control board (CCB) — A formal group of people responsible for approving or rejecting changes on a project.

change control system — A formal, documented process that describes when and how official project documents may be changed.

closing processes — Formalizing acceptance of the project or project phase and ending it efficiently.

coercive power — Using punishment, threats, or other negative approaches to get people to do things they do not want to do.

collaborating mode — A conflict-handling mode where decision makers incorporate different viewpoints and insights to develop consensus and commitment.

communications management plan — A document that guides project communications.

compromise mode — Using a give-and-take approach to resolving conflicts; bargaining and searching for solutions that bring some degree of satisfaction to all the parties in a dispute.

configuration management — A process that ensures that the descriptions of the project's products are correct and complete.

conformance — Delivering products that meet requirements and fitness for use.

conformance to requirements — The project processes and products meet written specifications.

confrontation mode — Directly facing a conflict using a problem-solving approach that allows affected parties to work through their disagreements.

constructive change orders — Oral or written acts or omissions by someone with actual or apparent authority that can be construed to have the same effect as a written change order.

contingency allowances — Provisions held by the project sponsor or organization to reduce the risk of cost or schedule overruns to an acceptable level; also called contingency reserves.

contingency plans — Predefined actions that the project team will take if an identified risk event occurs.

contingency reserves — Provisions held by the project sponsor or organization to reduce the risk of cost or schedule overruns to an acceptable level; also called contingency allowances.

contract — A mutually binding agreement that obligates the seller to provide the specified products or services, and obligates the buyer to pay for them.

control chart — A graphic display of data that illustrates the results of a process over time.

controlling costs — Controlling changes to the project budget.

cost management plan — A document that describes how cost variances will be managed on the project.

cost baseline — A time-phased budget that project managers use to measure and monitor cost performance.

cost of capital — The return available by investing the capital elsewhere.

cost of nonconformance — Taking responsibility for failures or not meeting quality expectations.

cost of quality — The cost of conformance plus the cost of nonconformance.

cost performance index (CPI) — The ratio of earned value to actual cost; can be used to estimate the projected cost to complete the project.

cost variance (CV) — The earned value minus the actual cost.

cost plus award fee (CPAF) contract — A contract in which the buyer pays the supplier for allowable performance costs plus an award fee based on the satisfaction of subjective performance criteria.

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cost plus fixed fee (CPFF) contract — A contract in which the buyer pays the supplier for allowable performance costs plus a fixed fee payment usually based on a percentage of estimated costs.

cost plus incentive fee (CPIF) contract — A contract in which the buyer pays the supplier for allowable performance costs along with a predetermined fee and an incentive bonus.

cost plus percentage of costs (CPPC)

contract — A contract in which the buyer pays the supplier for allowable performance costs along with a predetermined percentage based on total costs.

cost-reimbursable contracts — Contracts involving payment to the supplier for direct and indirect actual costs.

crashing — A technique for making cost and schedule trade-offs to obtain the greatest amount of schedule compression for the least incremental cost.

critical chain scheduling — A method of scheduling that takes limited resources into account when creating a project schedule and includes buffers to protect the project completion date.

critical path — The series of activities in a network diagram that determines the earliest completion of the project; it is the longest path through the network diagram and has the least amount of slack or float.

critical path method (CPM) or critical path analysis — A project network analysis technique used to predict total project duration.

decision tree — A diagramming analysis technique used to help select the best course of action in situations in which future outcomes are uncertain.

decomposition — Subdividing project deliverables into smaller pieces.

defect — Any instance where the product or service fails to meet customer requirements.

DMAIC (Define, Measure, Analyze, Improve, Control) — A systematic, closed-loop process for continued improvement that is scientific and fact based.

definitive estimate — A cost estimate that provides an accurate estimate of project costs.

deliverable — A product or service, such as a technical report, a training session, a piece of hardware, or a segment of software code, produced or provided as part of a project.

Delphi technique — An approach used to derive a consensus among a panel of experts, to make predictions about future developments.

dependency — The sequencing of project activities or tasks; also called a relationship.

deputy project managers — People who fill in for project managers in their absence and assist them as needed, similar to the role of a vice president.

design of experiments — A quality technique that helps identify which variables have the most influence on the overall outcome of a process.

determining the budget — Allocating the overall cost estimate to individual work items to establish a baseline for measuring performance.

direct costs — Costs that can be directly related to producing the products and services of the project.

directives — New requirements imposed by management, government, or some external influence.

discretionary dependencies — Sequencing of project activities or tasks defined by the project team and used with care since they may limit later scheduling options.

discount factor — A multiplier for each year based on the discount rate and year.

discount rate — The rate used in discounting future cash flow; also called the capitalization rate or opportunity cost of capital.

dummy activities — Activities with no duration and no resources used to show a logical relationship between two activities in the arrow diagramming method of project network diagrams.

duration — The actual amount of time worked on an activity *plus* elapsed time.

early finish date — The earliest possible time an activity can finish based on the project network logic.

early start date — The earliest possible time an activity can start based on the project network logic.

earned value (EV) — An estimate of the value of the physical work actually completed.

earned value management (EVM) — A project performance measurement technique that integrates scope, time, and cost data.

effort — The number of workdays or work hours required to complete a task.

empathic listening — Listening with the intent to understand.

enterprise or portfolio project management software — Software that integrates information from multiple projects to show the status of active, approved, and future projects across an entire organization.

estimate at completion (EAC) — An estimate of what it will cost to complete the project based on performance to date.

estimating costs — Developing an approximation or estimate of the costs of the resources needed to complete the project.

ethics — A set of principles that guide our decision making based on personal values of what is “right” and “wrong.”

executing processes — Coordinating people and other resources to carry out the project plans and produce the products, services, or results of the project or project phase.

executive steering committee — A group of senior executives from various parts of the organization who regularly review important corporate projects and issues.

expectations management matrix — A tool to help understand unique measures of success for a particular project.

expected monetary value (EMV) — The product of the risk event probability and the risk event’s monetary value.

expert power — Using one’s personal knowledge and expertise to get people to change their behavior.

extrinsic motivation — Causes people to do something for a reward or to avoid a penalty.

external dependencies — Sequencing of project activities or tasks that involve relationships between project and non-project activities.

external failure cost — A cost related to all errors not detected and corrected before delivery to the customer.

fallback plans — Plans developed for risks that have a high impact on meeting project objectives, to be implemented if attempts to reduce the risk are not effective.

fast tracking — A schedule compression technique in which you do activities in

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parallel that you would normally do in sequence.

features — The special characteristics that appeal to users.

feeding buffers — Additional time added before tasks on the critical path that are preceded by non-critical-path tasks.

fishbone diagram — Diagram that traces complaints about quality problems back to the responsible production operations to help find the root cause. Also known as cause-and-effect diagram or Ishikawa diagram.

fitness for use — A product can be used as it was intended.

finish-to-start dependency — A relationship on a project network diagram where the “from” activity must be finished before the “to” activity can be started.

fixed-price contract — Contract with a fixed total price for a well-defined product or service; also called a lump-sum contract.

float — The amount of time a project activity may be delayed without delaying a succeeding activity or the project finish date; also called slack.

flowchart — Graphic display of the logic and flow of processes that helps you analyze how problems occur and how processes can be improved.

forecasts — Used to predict future project status and progress based on past information and trends.

forcing mode — Using a win-lose approach to conflict resolution to get one’s way.

forward pass — A network diagramming technique that determines the early start and early finish dates for each activity.

free slack (free float) — The amount of time an activity can be delayed without delaying

the early start of any immediately following activities.

functionality — The degree to which a system performs its intended function.

functional organizational structure — An organizational structure that groups people by functional areas such as information technology, manufacturing, engineering, and human resources.

Gantt chart — A standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format; sometimes referred to as bar chart.

Google Docs — Online applications offered by Google that allow users to create, share, and edit documents, spreadsheets, and presentations online.

green IT or green computing — Developing and using computer resources in an efficient way to improve economic viability, social responsibility, and environmental impact.

groupthink — Conformance to the values or ethical standards of a group.

hierarchy of needs — A pyramid structure illustrating Maslow’s theory that people’s behaviors are guided or motivated by a sequence of needs.

histogram — A bar graph of a distribution of variables.

human resources frame — Focuses on producing harmony between the needs of the organization and the needs of people.

indirect costs — Costs that are not directly related to the products or services of the project, but are indirectly related to performing the project.

influence diagram — Diagram that represents decision problems by displaying essential elements, including decisions,

Glossary

uncertainties, and objectives, and how they influence each other.

initiating processes — Defining and authorizing a project or project phase.

intangible costs or benefits — Costs or benefits that are difficult to measure in monetary terms.

integrated change control — Identifying, evaluating, and managing changes throughout the project life cycle.

integration testing — Testing that occurs between unit and system testing to test functionally grouped components to ensure a subset(s) of the entire system works together.

interface management — Identifying and managing the points of interaction between various elements of a project.

internal failure cost — A cost incurred to correct an identified defect before the customer receives the product.

internal rate of return (IRR) — The discount rate that results in an NPV of zero for a project.

interviewing — A fact-finding technique that is normally done face-to-face, but can also occur through phone calls, e-mail, or instant messaging.

intrinsic motivation — Causes people to participate in an activity for their own enjoyment.

Ishikawa diagram — Diagram that traces complaints about quality problems back to the responsible production operations to help find the root cause. Also known as cause-and-effect diagram or fishbone diagram.

ISO 9000 — A quality system standard developed by the International Organization

for Standardization (ISO) that includes a three-part, continuous cycle of planning, controlling, and documenting quality in an organization.

issue — A matter under question or dispute that could impede project success.

issue log — A tool to document and monitor the resolution of project issues.

IT governance — Addresses the authority and control for key IT activities in organizations, including IT infrastructure, IT use, and project management.

Joint Application Design (JAD) — Using highly organized and intensive workshops to bring together project stakeholders—the sponsor, users, business analysts, programmers, and so on—to jointly define and design information systems.

kick-off meeting — A meeting held at the beginning of a project so that stakeholders can meet each other, review the goals of the project, and discuss future plans.

known risks — Risks that the project team have identified and analyzed and can be managed proactively.

known unknowns — Dollars included in a cost estimate to allow for future situations that may be partially planned for (sometimes called contingency reserves) and are included in the project cost baseline.

late finish date — The latest possible time an activity can be completed without delaying the project finish date.

late start date — The latest possible time an activity may begin without delaying the project finish date.

leader — A person who focuses on long-term goals and big-picture objectives, while inspiring people to reach those goals.

G.8

learning curve theory — A theory that states that when many items are produced repetitively, the unit cost of those items normally decreases in a regular pattern as more units are produced.

legitimate power — Getting people to do things based on a position of authority.

lessons-learned report — Reflective statements written by project managers and their team members to document important things they have learned from working on the project.

life cycle costing — Considers the total cost of ownership, or development plus support costs, for a project.

lump-sum contract — Contract with a fixed total price for a well-defined product or service; also called a fixed-price contract.

Maintainability — The ease of performing maintenance on a product.

make-or-buy decision — When an organization decides if it is in its best interests to make certain products or perform certain services inside the organization, or if it is better to buy them from an outside organization.

Malcolm Baldrige National Quality Award

Award — An award started in 1987 to recognize companies that have achieved a level of world-class competition through quality management.

management reserves — Dollars included in a cost estimate to allow for future situations that are unpredictable (sometimes called unknown unknowns).

manager — A person who deals with the day-to-day details of meeting specific goals.

mandatory dependencies — Sequencing of project activities or tasks that are inherent

in the nature of the work being done on the project.

matrix organizational structure — An organizational structure in which employees are assigned to both functional and project managers.

maturity model — A framework for helping organizations improve their processes and systems.

mean — The average value of a population.

measurement and test equipment costs

costs — The capital cost of equipment used to perform prevention and appraisal activities.

merge — When two or more nodes precede a single node on a network diagram.

methodology — Describes *how* things should be done.

metric — A standard of measurement.

milestone — A significant event that normally has no duration on a project; serves as a marker to help in identifying necessary activities, setting schedule goals, and monitoring progress.

mind mapping — A technique that uses branches radiating out from a core idea to structure thoughts and ideas.

mirroring — Matching certain behaviors of the other person.

Monte Carlo analysis — A risk quantification technique that simulates a model's outcome many times, to provide a statistical distribution of the calculated results.

monitoring and controlling processes

— Regularly measuring and monitoring progress to ensure that the project team meets the project objectives.

multitasking — When a resource works on more than one task at a time.

Murphy's Law — Principle that if something can go wrong, it will.

Myers-Briggs Type Indicator (MBTI) — A popular tool for determining personality preferences.

net present value (NPV) analysis — A method of calculating the expected net monetary gain or loss from a project by discounting all expected future cash inflows and outflows to the present point in time.

network diagram — A schematic display of the logical relationships or sequencing of project activities.

node — The starting and ending point of an activity on an activity-on-arrow diagram.

normal distribution — A bell-shaped curve that is symmetrical about the mean of the population.

offshoring — Outsourcing from another country.

organizational breakdown structure (OBS) — A specific type of organizational chart that shows which organizational units are responsible for which work items.

organizational culture — A set of shared assumptions, values, and behaviors that characterize the functioning of an organization.

organizational process assets — Formal and informal plans, policies, procedures, guidelines, information systems, financial systems, management systems, lessons learned, and historical information that can be used to influence a project's success.

opportunities — Chances to improve the organization.

opportunity cost of capital — The rate used in discounting future cash flow; also called the capitalization rate or discount rate.

outsourcing — When an organization acquires goods and/or sources from an outside source.

overallocation — When more resources than are available are assigned to perform work at a given time.

overrun — The additional percentage or dollar amount by which actual costs exceed estimates.

parametric modeling — A cost-estimating technique that uses project characteristics (parameters) in a mathematical model to estimate project costs.

Pareto analysis — Identifying the vital few contributors that account for most quality problems in a system.

Pareto chart — Histogram that helps identify and prioritize problem areas.

Parkinson's Law — Principle that work expands to fill the time allowed.

payback period — The amount of time it will take to recoup, in the form of net cash inflows, the total dollars invested in a project.

performance — How well a product or service performs the customer's intended use.

PERT weighted average — optimistic time + 4 * most likely time + pessimistic time

planned value (PV) — That portion of the approved total cost estimate planned to be spent on an activity during a given period.

planning processes — Devising and maintaining a workable scheme to ensure that the project addresses the organization's needs.

G.10

phase exit or kill point — Management review that should occur after each project phase to determine if projects should be continued, redirected, or terminated.

Point of Total Assumption (PTA) — The cost at which the contractor assumes total responsibility for each additional dollar of contract cost in a fixed price incentive fee contract.

political frame — Addresses organizational and personal politics.

politics — Competition between groups or individuals for power and leadership.

power — The potential ability to influence behavior to get people to do things they would not otherwise do.

Precedence Diagramming Method (PDM) — A network diagramming technique in which boxes represent activities.

predictive life cycle — A software development approach used when the scope of the project can be clearly articulated and the schedule and cost can be accurately predicted.

prevention cost — The cost of planning and executing a project so that it is error-free or within an acceptable error range.

probability/impact matrix or chart — A matrix or chart that lists the relative probability of a risk occurring on one side of a matrix or axis on a chart and the relative impact of the risk occurring on the other.

probabilistic time estimates — Duration estimates based on using optimistic, most likely, and pessimistic estimates of activity durations instead of using one specific or discrete estimate.

problems — Undesirable situations that prevent the organization from achieving its goals.

process — A series of actions directed toward a particular result.

process adjustments — Adjustments made to correct or prevent further quality problems based on quality control measurements.

procurement — Acquiring goods and/or services from an outside source.

profit margin — The ratio between revenues and profits.

profits — Revenues minus expenses.

program — A group of projects managed in a coordinated way to obtain benefits and control not available from managing them individually.

Program Evaluation and Review Technique (PERT) — A project network analysis technique used to estimate project duration when there is a high degree of uncertainty with the individual activity duration estimates.

program manager — A person who provides leadership and direction for the project managers heading the projects within a program.

progress reports — Reports that describe what the project team has accomplished during a certain period of time.

project — A temporary endeavor undertaken to create a unique product, service, or result.

project acquisition — The last two phases in a project (implementation and close-out) that focus on delivering the actual work.

project archives — A complete set of organized project records that provide an accurate history of the project.

project buffer — Additional time added before the project's due date.

Glossary

project charter — A document that formally recognizes the existence of a project and provides direction on the project's objectives and management.

project cost management — The processes required to ensure that the project is completed within the approved budget.

project feasibility — The first two phases in a project (concept and development) that focus on planning.

project integration management —

Processes that coordinate all project management knowledge areas throughout a project's life, including developing the project charter, developing the preliminary project scope statement, developing the project management plan, directing and managing the project, monitoring and controlling the project, providing integrated change control, and closing the project.

project life cycle — A collection of project phases, such as concept, development, implementation, and close-out.

project management — The application of knowledge, skills, tools, and techniques to project activities to meet project requirements.

Project Management Institute (PMI) — An international professional society for project managers.

project management knowledge areas — Project integration management, scope, time, cost, quality, human resource, communications, risk, and procurement management.

Project Management Office (PMO) — An organizational group responsible for coordinating the project management functions throughout an organization.

project management plan — A document used to coordinate all project planning

documents and guide project execution and control.

project management process groups — The progression of project activities from initiation to planning, executing, monitoring and controlling, and closing.

Project Management Professional

(PMP) — Certification provided by PMI that requires documenting project experience and education, agreeing to follow the PMI code of ethics, and passing a comprehensive exam.

project management tools and

techniques — Methods available to assist project managers and their teams; some popular tools in the time management knowledge area include Gantt charts, network diagrams, and critical path analysis.

project manager — The person responsible for working with the project sponsor, the project team, and the other people involved in a project to meet project goals.

project organizational structure — An organizational structure that groups people by major projects, such as specific aircraft programs.

project procurement management — The processes required to acquire goods and services for a project from outside the performing organization.

project portfolio management (portfolio management) — When organizations group and manage projects as a portfolio of investments that contribute to the entire enterprise's success.

project quality management — Ensuring that a project will satisfy the needs for which it was undertaken.

project scope management — The processes involved in defining and controlling what work is or is not included in a project.

G.12

project scope statement — A document that includes, at a minimum, a description of the project, including its overall objectives and justification, detailed descriptions of all project deliverables, and the characteristics and requirements of products and services produced as part of the project.

PRojects IN Controlled Environments (PRINCE2)

— A project management methodology developed in the U.K. that defines 45 separate sub-processes and organizes these into eight process groups.

project sponsor — The person who provides the direction and funding for a project.

project time management — The processes required to ensure timely completion of a project.

proposal — A document prepared by sellers when there are different approaches for meeting buyer needs.

prototyping — Developing a working replica of the system or some aspect of the system to help define user requirements.

quality — The totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs or the degree to which a set of inherent characteristics fulfill requirements.

quality assurance — Periodically evaluating overall project performance to ensure that the project will satisfy the relevant quality standards.

quality audit — Structured review of specific quality management activities that helps identify lessons learned and can improve performance on current or future projects.

quality circles — Groups of nonsupervisors and work leaders in a single company department who volunteer to conduct group studies on how to improve the effectiveness of work in their department.

quality control — Monitoring specific project results to ensure that they comply with the relevant quality standards and identifying ways to improve overall quality.

quality planning — Identifying which quality standards are relevant to the project and how to satisfy them.

RACI charts — Charts that show Responsibility, Accountability, Consultation, and Informed roles for project stakeholders.

rapport — A relation of harmony, conformity, accord, or affinity.

rate of performance (RP) — The ratio of actual work completed to the percentage of work planned to have been completed at any given time during the life of the project or activity.

Rational Unified Process (RUP) — An iterative software development process that focuses on team productivity and delivers software best practices to all team members.

referent power — Getting people to do things based on an individual's personal charisma.

reliability — The ability of a product or service to perform as expected under normal conditions.

Request for Proposal (RFP) — A document used to solicit proposals from prospective suppliers.

Request for Quote (RFQ) — A document used to solicit quotes or bids from prospective suppliers.

required rate of return — The minimum acceptable rate of return on an investment.

requirement — A condition or capability that must be met or possessed by a system, product, service, result, or component to

satisfy a contract, standard, specification, or other formal document.

requirements management plan — A plan that describes how project requirements will be analyzed, documented, and managed.

requirements traceability matrix — A table that lists requirements, various attributes of each requirement, and the status of the requirements to ensure that all requirements are addressed.

reserves — Dollars included in a cost estimate to mitigate cost risk by allowing for future situations that are difficult to predict.

residual risks — Risks that remain after all of the response strategies have been implemented.

resource breakdown structure — A hierarchical structure that identifies the project's resources by category and type.

resource histogram — A column chart that shows the number of resources assigned to a project over time.

resource leveling — A technique for resolving resource conflicts by delaying tasks.

resource loading — The amount of individual resources an existing schedule requires during specific time periods.

resources — People, equipment, and materials.

responsibility assignment matrix (RAM) — A matrix that maps the work of the project as described in the WBS to the people responsible for performing the work as described in the organizational breakdown structure (OBS).

return on investment (ROI) — (Benefits minus costs) divided by costs.

reward power — Using incentives to induce people to do things.

rework — Action taken to bring rejected items into compliance with product requirements or specifications or other stakeholder expectations.

risk — An uncertainty that can have a negative or positive effect on meeting project objectives.

risk acceptance — Accepting the consequences should a risk occur.

risk-averse — Having a low tolerance for risk.

risk avoidance — Eliminating a specific threat or risk, usually by eliminating its causes.

risk breakdown structure — A hierarchy of potential risk categories for a project.

risk enhancement — Changing the size of an opportunity by identifying and maximizing key drivers of the positive risk.

risk events — Specific uncertain events that may occur to the detriment or enhancement of the project.

risk exploitation — Doing whatever you can to make sure the positive risk happens.

risk factors — Numbers that represent overall risk of specific events, given their probability of occurring and the consequence to the project if they do occur.

risk management plan — A plan that documents the procedures for managing risk throughout a project.

risk mitigation — Reducing the impact of a risk event by reducing the probability of its occurrence.

risk-neutral — A balance between risk and payoff.

G.14

risk owner — The person who will take responsibility for a risk and its associated response strategies and tasks.

risk register — A document that contains results of various risk management processes, often displayed in a table or spreadsheet format.

risk-seeking — Having a high tolerance for risk.

risk sharing — Allocating ownership of the risk to another party.

risk tolerance — The amount of satisfaction or pleasure received from a potential payoff; also called risk utility.

risk transference — Shifting the consequence of a risk and responsibility for its management to a third party.

risk utility — The amount of satisfaction or pleasure received from a potential payoff; also called risk tolerance.

Robust Design methods — Methods that focus on eliminating defects by substituting scientific inquiry for trial-and-error methods.

rough order of magnitude (ROM) estimate — A cost estimate prepared very early in the life of a project to provide a rough idea of what a project will cost.

runaway projects — Projects that have significant cost or schedule overruns.

run chart — Chart that displays the history and pattern of variation of a process over time.

scatter diagram — Diagram that helps to show if there is a relationship between two variables; also called XY charts.

schedule baseline — The approved planned schedule for the project.

schedule performance index (SPI) — The ratio of earned value to planned value; can be used to estimate the projected time to complete a project.

schedule variance (SV) — The earned value minus the planned value.

scope — All the work involved in creating the products of the project and the processes used to create them.

scope baseline — The approved project scope statement and its associated WBS and WBS dictionary.

scope creep — The tendency for project scope to keep getting bigger.

secondary risks — Risks that are a direct result of implementing a risk response.

sellers — Contractors, suppliers, or providers who provide goods and services to other organizations.

sensitivity analysis — A technique used to show the effects of changing one or more variables on an outcome.

seven run rule — If seven data points in a row on a quality control chart are all below the mean, above the mean, or are all increasing or decreasing, then the process needs to be examined for nonrandom problems.

SharePoint portal — Allows users to create custom Web sites to access documents and applications stored on shared devices.

six 9s of quality — A measure of quality control equal to 1 fault in 1 million opportunities.

Six Sigma — A comprehensive and flexible system for achieving, sustaining, and maximizing business success that is uniquely driven by close understanding of customer needs, disciplined use of facts, data, statistical analysis, and diligent attention to

managing, improving, and reinventing business processes.

Six Sigma methodologies — DMAIC (Define, Measure, Analyze, Improve, and Control) is used to improve an existing business process and DMADV (Define, Measure, Analyze, Design, and Verify) is used to create new product or process designs.

slack — The amount of time a project activity may be delayed without delaying a succeeding activity or the project finish date; also called float.

slipped milestone — A milestone activity that is completed later than planned.

SMART criteria — Guidelines to help define milestones that are specific, measurable, assignable, realistic, and time-framed.

smoothing mode — Deemphasizing or avoiding areas of differences and emphasizing areas of agreements.

software defect — Anything that must be changed before delivery of the program.

Software Quality Function Deployment (SQFD) model — A maturity model that focuses on defining user requirements and planning software projects.

staffing management plan — A document that describes when and how people will be added to and taken off a project team.

stakeholder management strategy — An approach to help increase the support of stakeholders throughout the project.

stakeholder register — A document that includes details related to the identified project stakeholders.

stakeholders — People involved in or affected by project activities.

standard — Describes best practices for what should be done.

standard deviation — A measure of how much variation exists in a distribution of data.

start-to-finish dependency — A relationship on a project network diagram where the “from” activity cannot start before the “to” activity is finished.

start-to-start dependency — A relationship on a project network diagram in which the “from” activity cannot start.

statement of work (SOW) — A description of the work required for the procurement.

statistical sampling — Choosing part of a population of interest for inspection until the “to” activity starts.

status reports — Reports that describe where the project stands at a specific point in time.

strategic planning — Determining long-term objectives by analyzing the strengths and weaknesses of an organization, studying opportunities and threats in the business environment, predicting future trends, and projecting the need for new products and services.

structural frame — Deals with how the organization is structured (usually depicted in an organizational chart) and focuses on different groups’ roles and responsibilities to meet the goals and policies set by top management.

subproject managers — People responsible for managing the subprojects that a large project might be broken into.

sunk cost — Money that has been spent in the past.

SWOT analysis — Analyzing Strengths, Weaknesses, Opportunities, and Threats; used to aid in strategic planning.

symbolic frame — Focuses on the symbols, meanings, and culture of an organization.

G.16

synergy — An approach where the whole is greater than the sum of the parts.

system outputs — The screens and reports the system generates.

systems — Sets of interacting components working within an environment to fulfill some purpose.

systems analysis — A problem-solving approach that requires defining the scope of the system to be studied, and then dividing it into its component parts for identifying and evaluating its problems, opportunities, constraints, and needs.

systems approach — A holistic and analytical approach to solving complex problems that includes using a systems philosophy, systems analysis, and systems management.

systems development life cycle (SDLC) — A framework for describing the phases involved in developing and maintaining information systems.

systems management — Addressing the business, technological, and organizational issues associated with creating, maintaining, and making changes to a system.

systems philosophy — An overall model for thinking about things as systems.

system stakeholder register — A public document that includes details related to the identified project stakeholders.

systems thinking — Taking a holistic view of an organization to effectively handle complex situations.

tangible costs or benefits — Costs or benefits that can be easily measured in dollars.

task — An element of work, normally found on the WBS, that has an expected duration and cost, and expected resource requirements; also called an activity.

team development — Building individual and group skills to enhance project performance.

termination clause — A contract clause that allows the buyer or supplier to end the contract.

testing — Testing the entire system as one entity to ensure that it is working properly.

Theory of Constraints (TOC) — A management philosophy that states that any complex system at any point in time often has only one aspect or constraint that is limiting its ability to achieve more of its goal.

three-point estimate — An estimate that includes an optimistic, most likely, and pessimistic estimate.

time and material (T&M) contracts — A hybrid of both fixed-price and cost-reimbursable contracts.

top-down approach — Creating a WBS by starting with the largest items of the project and breaking them into their subordinate items.

top-down estimates — A cost estimating technique that uses the actual cost of a previous, similar project as the basis for estimating the cost of the current project, also called analogous estimates.

Top Ten Risk Item Tracking — A qualitative risk analysis tool for identifying risks and maintaining an awareness of risks throughout the life of a project.

total slack (total float) — The amount of time an activity may be delayed from its early start without delaying the planned project finish date.

Tracking Gantt chart — A Gantt chart that compares planned and actual project schedule information.

triggers — Indications for actual risk events.

triple constraint — Balancing scope, time, and cost goals.

Tuckman model — Describes five stages of team development: forming, storming, norming, performing, and adjourning.

unit pricing — An approach in which the buyer pays the supplier a predetermined amount per unit of service, and the total value of the contract is a function of the quantities needed to complete the work.

unit test — A test of each individual component (often a program) to ensure that it is as defect-free as possible.

unknown risks — Risks that have not been identified and analyzed so they cannot be managed proactively.

unknown unknowns — Dollars included in a cost estimate to allow for future situations that are unpredictable (sometimes called management reserves).

use case modeling — A process for identifying and modeling business events, who initiated them, and how the system should respond to them.

user acceptance testing — An independent test performed by end users prior to accepting the delivered system.

variance — The difference between planned and actual performance.

virtualization — Hiding the physical characteristics of computing resources from their

users, such as making a single server, operating system, application, or storage device appear to function as multiple virtual resources.

virtual team — A group of individuals who work across time and space using communication technologies.

watch list — A list of risks that are low priority, but are still identified as potential risks.

WBS dictionary — A document that describes detailed information about each WBS item.

weighted scoring model — A technique that provides a systematic process for basing project selection on numerous criteria.

wiki — A Web site that has a page or pages designed to enable anyone who accesses it to contribute or modify content.

withdrawal mode — Retreating or withdrawing from an actual or potential disagreement.

workarounds — Unplanned responses to risk events when there are no contingency plans in place.

work breakdown structure (WBS) — A deliverable-oriented grouping of the work involved in a project that defines the total scope of the project.

work package — A task at the lowest level of the WBS.

yield — The number of units handled correctly through the development process.

Licensed to:



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