



Object-Oriented Programming Using C++

Third Edition

Joyce Farrell

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Preface

Object-Oriented Programming Using C++, Third Edition is designed for many levels of programming students and a variety of programming teaching styles. Readers who are new to programming will find the basics of programming logic and the C++ programming language covered thoroughly and clearly. Clear, thorough explanations, multiple programming examples, and step-by-step programming lessons provide beginning readers with a solid C++ background. Users who know some C++ syntax, but are new to object-oriented programming, will find objects explored thoroughly from the first chapters. Objects are introduced early, so those who want to learn objects at the start of their programming experience can do so. Users who want to postpone objects can simply omit the later sections of each chapter and cover the basic programming structures with simple data types before returning to the more complex objects later on.

Organization and Coverage

Object-Oriented Programming Using C++ contains 14 chapters and five appendices that present clear text explanation, directed hands-on instruction, and a wealth of exercises. In these chapters, readers learn about programming logic in general, C++ syntax in particular, and gain an appreciation for and understanding of the object-oriented approach. When readers complete the book, they will have an understanding of object-oriented concepts as they apply to programming, and the ability to use these concepts to develop C++ programs.

Chapter 1 provides an overview of programming in general and C++ in particular. You work with variables, comments, input and output, and data structures. This book distinguishes itself from other C++ books by introducing structure objects in Chapter 1 so that students start thinking in an object-oriented manner from the beginning of the course.

Chapter 2 focuses on evaluating C++ expressions. Chapters 3, 4, and 5 discuss decisions, loops, and arrays, strings, and pointers—all fundamental building blocks of C++ programs. Chapter 6 provides a solid foundation in writing and using functions including passing parameters by value and by reference and returning values from functions.

Once students understand C++ basics they are ready for Chapters 7 and 8, which delve more completely into the object-oriented aspects of C++, featuring classes, objects, and design issues. Friend functions and operator overloading are covered in Chapter 9, and inheritance, another important OO feature, is explained in Chapter 10.

Advanced C++ features such as templates, exception handling, and advanced input and output techniques, including writing objects to files, are covered in Chapters 11, 12, and 13. Chapter 14 presents some interesting adjuncts to C++ that make it such a powerful language, including creating enumerations, working with bits, and understanding recursion.

Five appendices offer further explanation to topics mentioned in the chapters. Appendices A and B describe how to get started with various C++ compilers. Appendix C contains a handy table of precedence and associativity. Appendix D contains information on formatting output, and Appendix E is a lesson in generating random numbers—an important skill in creating scientific simulations as well as in creating games.

Approach

Object-Oriented Programming Using C++ teaches object-oriented concepts using C++ as a tool to demonstrate these concepts. This book teaches programming concepts using a task-driven rather than a command-driven approach. Structures are introduced in Chapter 1 so that students start thinking about objects right from the start. However, discussion of objects is reserved for the last sections of the first six chapters, so that instructors who prefer to start with a procedural approach can omit these sections at first, then go back to cover them after the first six chapters have been completed.

Features

Object-Oriented Programming Using C++ is an exceptional textbook because it also includes the following features:

- **Objectives.** A brief list of objectives appears at the beginning of each chapter so the student has an overview of the main topics to be covered.
- **Tips.** These provide additional information about a procedure or topic, such as an alternative method of performing a procedure.
- **Figures.** Each chapter averages over 30 figures that contain code, working programs, or screen shots of the programs' execution.
- **You Do It.** After students study each chapter's concepts, they are invited to create small applications that illustrate the concepts. Each application is explained step-by-step as the students add appropriate code to interesting applications.
- **Summaries.** A summary that recaps the programming concepts and commands covered follows each chapter.
- **Key Terms.** Each chapter contains a list of all the key terms defined in the chapter, along with explanation and presented in the order covered in the chapter. The list of Key Terms serves as an additional chapter summary.

- **Review Questions.** Each chapter includes 20 multiple choice review questions that test students' understanding of what they learned in the chapter.
- **Exercises.** Each chapter contains interesting exercises that provide students with the opportunity to apply the concepts they have mastered by writing C++ programs.
- **Debugging Exercises.** Each chapter ends with debugging exercises—programs with a few syntax or logical errors. The student can find the errors and fix them, developing crucial skills of reading others' programs, analyzing error messages and probable cause of errors, and solving problems.
- **Running Cases.** The book contains two running cases in which the student develops large classes, adding appropriate features as each new concept is introduced. By the end of the book the student has created two substantial working classes.

Teaching Tools

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

- **Instructor's Manual.** Additional instructional material to assist in class preparation, including suggestions for lecture topics, including a 14 and 16 week syllabus outline.
 - **Solution Files.** Solutions to all end-of-chapter materials. (Due to the nature of programming, students' solutions may differ from these solutions and still be correct.)
 - **Data Files.** Data files, containing all of the data that students will use for the exercises in this book, are provided on the Thomson Course Technology Web site and on the Instructor's Resource CD-ROM. Additionally, all complete programs that are presented as figures in the book are included so that students can execute the files and experiment with them without a lot of tedious typing. See the "Read This Before You Begin" section for more information on Data Files.
 - **ExamView Test Bank.** 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 time for the instructor by grading each exam automatically.
 - **PowerPoint Presentations.** This book 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.
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I would like to thank all of the people who have this book a reality, especially Lisa Ruffolo, my Developmental Editor who has kept up her good humor through the last two editions of this book as well as several others. She makes me look good. Thanks also to Tricia Coia, Senior Product Manager, whose help and friendship have been immeasurable not just on this book, but for the decade I have been associated with Thomson Course Technology. Thanks to Danielle Chouhan, Production Editor, Mary Franz, Managing Editor, and Will Pitkin, Managing Editor, as well as the testers in Quality Assurance who play a big part in making sure we produce a high-quality programming text.

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Thank you to my husband Geoff who runs all the errands so I can compile just one more program.

Finally, this book is dedicated to Jann Patton, my cousin and friend.

Read This Before You Begin

TO THE USER

Data Files

To complete some of the steps and exercises in this book, you will need data files that have been created for this book. Your instructor will provide the data files to you. You also can obtain the files electronically from the Thomson Course Technology Web site by connecting to www.course.com and then searching for this book by title, author, or ISBN.

Each chapter in this book has its own set of data files, which is stored in a separate folder. For example, the files for Chapter 3 are stored in the Chapter 3 folder. You can use a computer in your school lab or your own computer to complete the labs and exercises in this book.

Using Your Own Computer

To use your own computer to complete the steps and exercises in this book, you will need the following:

- A personal computer. This book was written and quality assurance tested using Microsoft Windows 2000 and XP and Linux.
 - A C++ compiler. Almost all examples in this book will work with any C++ compiler. This book was written using Microsoft Visual Studio 2005 Express Edition (beta) and quality assurance tested using Linux and Microsoft Visual C++ .NET 2003 Standard Edition, as well as Microsoft Visual C++ 2005 Express Edition (final). If your book came with a copy of Microsoft Visual Basic 2005 Express Edition, then you may install that on your computer and use it to complete the material. If you purchased a copy of the text, then you also received Microsoft Visual C++ 2005 Standard Edition on CD-ROM. Appendix A contains instructions on getting started with Microsoft Visual Studio. Appendix B contains instructions on getting started with some other compilers and suggests minor modifications you might have to make to your programs to get them to work correctly using different compilers.
 - Data files. You will not be able to complete the steps and exercises in this book using your own computer unless you have the data files. You can get the data files from your instructor, or you can obtain the data files electronically from the Thomson Course Technology Web site by connecting to www.course.com and then searching for this book title.
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Additional materials might be available for your course on the Web. Visit the Thomson Course Technology Web site—www.course.com—and periodically search this site for more details.

TO THE INSTRUCTOR

To complete the labs and exercises in this book, your students must use a set of data files. These files are included on the Teaching Tools CD-ROM. They may also be obtained electronically through the Thomson Course Technology Web site at www.course.com. Follow the instructions in the Help file to copy the data files to your server or standalone computer. You can view the Help file using a text editor such as WordPad or Notepad. Once the files are copied, you should instruct your users how to copy the files to their own computers or workstations.

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