

3D Graphics Programming With QuickDraw 3D



*Includes
QuickDraw 3D
software and
complete searchable
reference
documentation*

3D Graphics Programming With QuickDraw 3D



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About This Book

This book, *3D Graphics Programming With QuickDraw 3D*, describes QuickDraw 3D, a graphics library that you can use to define three-dimensional (3D) models, apply colors and other attributes to parts of the models, and create images of those models. You can use these capabilities to develop a wide range of applications, including interactive three-dimensional modeling, simulation and animation, data visualization, computer-aided drafting and design, games, and many other uses.

QuickDraw 3D provides these basic services:

- A large number of predefined geometric object types. You can create multiple instances of any type of object and assign them individual characteristics.
- Support for standard lighting types and illumination algorithms.
- Support for standard methods of projecting a model onto a viewing plane.
- Ability to perform both immediate and retained mode rendering, and support for multiple rendering styles.
- Built-in support for reading and writing data stored in a standard 3D data file format (the QuickDraw 3D Object Metafile).
- Support for any available 3D pointing devices, including devices that provide multiple degrees of freedom.
- Support for multiple operating and window systems. QuickDraw 3D is extremely portable and operates independently of the native window system. It provides consistent capabilities and performance across all supported platforms.
- Fast interactive rendering.

This book describes the application programming interfaces that you can use to develop applications and other software using QuickDraw 3D. Although QuickDraw 3D provides a large set of basic 3D objects and operations, it is also designed for easy extensibility, so that you can add custom capabilities (for instance, custom attributes) to those provided by QuickDraw 3D.

To use this book, you should be generally familiar with computer graphics and with 3D modeling and rendering techniques. This book explains some of the fundamental 3D concepts, but it is not intended to be either an introduction to or a technical reference for 3D graphics in general. Rather, it explains how QuickDraw 3D implements the standard techniques for 3D modeling, rendering, and interaction. You can consult the Bibliography near the end of this book for a list of some books that might help you acquire a basic knowledge of those techniques.

Note

The book *3D Computer Graphics*, second edition, by Alan Watt is particularly helpful for beginners. ♦

You should also be familiar with the techniques that underlie object-oriented programming. QuickDraw 3D is object oriented in the sense that many of its capabilities are accessed by creating and manipulating QuickDraw 3D objects. In addition, QuickDraw 3D classes (of which QuickDraw 3D objects are instances) are arranged in a hierarchy, which provides for method inheritance and method overriding.

Note

Currently, only C language programming interfaces are available. ♦

You should begin this book by reading the chapter “Introduction to QuickDraw 3D.” That chapter describes the basic capabilities provided by QuickDraw 3D and the QuickDraw 3D application programming interfaces that you use to create and manipulate objects in that hierarchy. It also provides source code samples illustrating how to use QuickDraw 3D to define, configure, and render simple 3D models.

If you just want to be able to display an existing 3D model in a window and don’t need to use the powerful capabilities of QuickDraw 3D, you can use the 3D Viewer supplied with QuickDraw 3D. The 3D Viewer allows you to display 3D data with minimal programming effort. It is therefore analogous to the movie controller provided with QuickTime. Read the chapter “3D Viewer” for complete information.

Once you are familiar with the basic uses of QuickDraw 3D, you can read the remaining chapters in this book for more information on any particular topic. For example, for complete information on the types of lights provided by QuickDraw 3D, see the chapter “Light Objects.”

Format of a Typical Chapter

Almost all chapters in this book follow a standard structure. For example, the chapter “Attribute Objects” contains these sections:

- “About Attribute Objects.” This section provides an overview of the features QuickDraw 3D provides for managing attribute objects.
- “Using Attribute Objects.” This section describes the tasks you can accomplish using attribute objects.
- “Attribute Objects Reference.” This section provides a complete reference for QuickDraw 3D attribute objects by describing the constants, data structures, and routines you can use to manage attribute objects. Each routine description also follows a standard format, which presents the routine declaration followed by a description of every parameter of the routine. Note, however, that this section is not included in the printed version of this book; it is available only online, on the enclosed CD-ROM.
- “Summary of Attribute Objects.” This section provides the C interfaces for the constants, data structures, routines, and result codes associated with attribute objects.

Conventions Used in This Book

This book uses special conventions to present certain types of information. Words that require special treatment appear in specific fonts or font styles. Certain information, such as parameter blocks, appears in special formats so that you can scan it quickly.

Special Fonts

All code listings, reserved words, and the names of actual data structures, constants, fields, parameters, and routines are shown in Courier (*this is Courier*).

Words that appear in **boldface** are key terms or concepts and are defined in the glossary.

Types of Notes

There are several types of notes used in this book.

Note

A note like this contains information that is interesting but possibly not essential to an understanding of the main text. (An example appears on page 1-3.) ♦

IMPORTANT

A note like this contains information that is essential for an understanding of the main text. (An example appears on page 1-14.) ▲

▲ **WARNING**

Warnings like this indicate potential problems that you should be aware of as you design your application. Failure to heed these warnings could result in system crashes or loss of data. (An example appears on page 16-8.) ▲

Development Environment

The system software routines described in this book are available using C interfaces. How you access these routines depends on the development environment you are using. When showing QuickDraw 3D routines, this book uses the C interfaces available with the Macintosh Programmer's Workshop (MPW).

All code listings in this book are shown in C. They show methods of using various routines and illustrate techniques for accomplishing particular tasks. All code listings have been compiled and, in most cases, tested. However, Apple Computer, Inc., does not intend for you to use these code samples in your application.

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