



# OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 4.5 with SPIR-V (9th Edition)

*By John Kessenich, Graham Sellers, Dave Shreiner*

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**Complete Coverage of OpenGL® 4.5—the Latest Version (Includes 4.5, 4.4, SPIR-V, and Extensions)**

The latest version of today’s leading worldwide standard for computer graphics, OpenGL 4.5 delivers significant improvements in application efficiency, flexibility, and performance. OpenGL 4.5 is an exceptionally mature and robust platform for programming high-quality computer-generated images and interactive applications using 2D and 3D objects, color images, and shaders.

*OpenGL® Programming Guide, Ninth Edition*, presents definitive, comprehensive information on OpenGL 4.5, 4.4, SPIR-V, OpenGL extensions, and the OpenGL Shading Language. It will serve you for as long as you write or maintain OpenGL code.

This edition of the best-selling “Red Book” fully integrates shader techniques alongside classic, function-centric approaches, and contains extensive code examples that demonstrate modern techniques. Starting with the fundamentals, its wide-ranging coverage includes drawing, color, pixels, fragments, transformations, textures, framebuffers, light and shadow, and memory techniques for advanced rendering and nongraphical applications. It also offers discussions of all shader stages, including thorough explorations of tessellation, geometric, and compute shaders.

New coverage in this edition includes

- Thorough coverage of OpenGL 4.5 Direct State Access (DSA), which overhauls the OpenGL programming model and how applications access objects
- Deeper discussions and more examples of shader functionality and GPU processing, reflecting industry trends to move functionality onto graphics

processors

- Demonstrations and examples of key features based on community feedback and suggestions
- Updated appendixes covering the latest OpenGL libraries, related APIs, functions, variables, formats, and debugging and profiling techniques

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## Editorial Review

### Review

#### Praise for previous editions of *OpenGL® Programming Guide*

“Wow! This book is basically one-stop shopping for OpenGL information. It is the kind of book that I will be reaching for a lot. Thanks to Dave, Graham, John, and Bill for an amazing effort.”

—Mike Bailey, professor, Oregon State University

“The most recent Red Book parallels the grand tradition of OpenGL; continuous evolution towards ever-greater power and efficiency. The eighth edition contains up-to-the minute information about the latest standard and new features, along with a solid grounding in modern OpenGL techniques that will work anywhere. The Red Book continues to be an essential reference for all new employees at my simulation company. What else can be said about this essential guide? I laughed, I cried, it was much better than Cats—I’ll read it again and again.”

—Bob Kuehne, president, Blue Newt Software

“OpenGL has undergone enormous changes since its inception twenty years ago. This new edition is your practical guide to using the OpenGL of today. Modern OpenGL is centered on the use of shaders, and this edition of the *Programming Guide* jumps right in, with shaders covered in depth in Chapter 2. It continues in later chapters with even more specifics on everything from texturing to compute shaders. No matter how well you know it or how long you’ve been doing it, if you are going to write an OpenGL program, you want to have a copy of the *OpenGL® Programming Guide* handy.”

—Marc Olano, associate professor, UMBC

“If you are looking for the definitive guide to programming with the very latest version of OpenGL, look no further. The authors of this book have been deeply involved in the creation of OpenGL 4.3, and everything you need to know about the cutting edge of this industry-leading API is laid out here in a clear, logical, and insightful manner.”

—Neil Trevett, president, Khronos Group

### About the Author

**John M. Kessenich**, staff software engineer at Google and creator of SPIR-V, has been active in OpenGL and GLSL Khronos standards’ development since 1999. He is the primary editor of the SPIR-V and GLSL specifications, and creates shader compiler tools and translators to promote portability of those standards.

**Graham Sellers**, AMD Software Architect and Engineering Fellow, is a Khronos API lead and represents AMD at the OpenGL ARB. He has contributed to the core Vulkan and OpenGL specs and extensions, and holds several graphics and image processing patents.

**Dave Shreiner** is a twenty-five year veteran of the computer graphics industry, where he’s worked almost exclusively with programming interfaces like OpenGL. In addition to having written and taught instructional courses on using computer graphics APIs, he was also the lead author for almost ten years on several Addison-Wesley publications relating to computer graphics.

## **Users Review**

### **From reader reviews:**

#### **Karen Johnson:**

Nowadays reading books become more and more than want or need but also turn into a life style. This reading addiction give you lot of advantages. The advantages you got of course the knowledge the rest of the information inside the book which improve your knowledge and information. The information you get based on what kind of publication you read, if you want attract knowledge just go with training books but if you want experience happy read one together with theme for entertaining including comic or novel. Typically the OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 4.5 with SPIR-V (9th Edition) is kind of book which is giving the reader unpredictable experience.

#### **James Bergeron:**

The e-book with title OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 4.5 with SPIR-V (9th Edition) contains a lot of information that you can learn it. You can get a lot of advantage after read this book. This kind of book exist new know-how the information that exist in this book represented the condition of the world at this point. That is important to you to know how the improvement of the world. This book will bring you within new era of the global growth. You can read the e-book on your smart phone, so you can read it anywhere you want.

#### **Arthur Lee:**

The book OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 4.5 with SPIR-V (9th Edition) has a lot info on it. So when you read this book you can get a lot of benefit. The book was written by the very famous author. The author makes some research prior to write this book. This particular book very easy to read you can get the point easily after looking over this book.

#### **Michael Espy:**

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