

Preface

The Mac is a computing platform that virtually defines ease of use, consistency, and effortless computing. The story of OpenGL on the Mac has been, shall we say, a bit more complex. With the arrival of OS X, the Mac platform supports even more ways of constructing OpenGL applications for the Mac. While there has been an apparent proliferation of OpenGL interfaces for the Mac, the platform itself has stabilized architecturally and programmatically and now offers the best developer and user experience in the industry for development of graphics applications. This is not just a statement of preference but an observation that, in many ways, the Mac is an OpenGL platform without peer. The Mac is a fun and efficient platform on which to develop applications, thanks to the set of OpenGL drivers at its core that support a rich and deep feature set, great performance, and deep integration in OS X. The Mac has excellent and usable tools for quickly monitoring OpenGL behavior, rapidly prototyping shaders, and digging deep to analyze OpenGL behavior in the application and driver. The Mac makes OpenGL development efficient and fun.

Although the development tools and environment are powerful and helpful, many corners of OpenGL on the Mac remain under-documented. A developer must choose among several development languages, user interface (UI) toolkits, window managers, and additional Mac APIs such as QuickTime and Core Image, yet still ensure that his or her software runs well on a variety of target Mac platforms. All of these factors can make using OpenGL on the Mac a challenging task even for developers who have been writing OpenGL applications on other platforms for years.

This book was put together with an eye toward simplifying and clarifying the ways in which OpenGL can be used on the Mac. It is our hope that by codifying all the information available about OpenGL on the Mac in one place and by presenting each interface with clarity and depth, developers will have a one-stop reference for all things OpenGL on the Mac.

Who Should Read This Book?

This book is intended for OpenGL programmers who wish to develop applications on Mac OS X. We target two categories of OpenGL programmers: those

who are new to OpenGL on the Mac and those who want to explore the specific benefits of writing OpenGL programs on the Mac.

For those who are new to OpenGL on the Mac—either existing Mac developers or those coming from other platforms—we provide advice on cross-platform issues, portable interfaces, and ideas about choosing native interfaces for the Mac. Existing Mac developers will find a single-source reference guide to all OpenGL interfaces on the Mac. For developers wishing to explore the power and richness of the Mac, we provide complete details on Mac-specific OpenGL extensions and ways of integrating other Mac APIs (such as QuickTime and Core Image) into applications.

Organization

This text is intended to be useful as both a programming guide and a reference manual. The text contains several chapters focused on OpenGL on the Mac and other chapters that cover related graphics information. A few appendices are included to cover supplemental information in detail. The chapters are organized as follows:

Architecture Chapters 1 through 4 describe the hardware and software architectures of the Mac. This part of the book also presents an introduction to performance considerations as they relate to architecture.

Configuration and Integration Chapter 5 explores the interfaces to OpenGL on the Mac in detail. Those new to OpenGL on the Mac should begin here.

CGL, AGL, Cocoa, GLUT Chapters 6 through 9 explore details behind the individual APIs. Each API is covered in detail in its own chapter, and the APIs are compared and contrasted in each chapter. These chapters form the core of this book.

Interoperability Chapter 10 collects a variety of interesting OpenGL and other Mac API integration ideas. This chapter describes how to incorporate video in an application with QuickTime, perform image effects on textures or scenes with Core Image, and process CoreVideo data in an application.

Performance Chapters 11 and 12 describe the basics of analyzing performance of OpenGL applications and offer tips about where common problems may surface and how they might be resolved. Analysis, tools, architecture, data types, and solutions are covered.

Extensions Chapter 13 presents a guide to detecting, integrating, and using OpenGL extensions. This chapter introduces extension management principles and tools and provides details on how to perform such management specifically on the Mac.

Additional Resources

As both OpenGL and the Mac platform evolve, so must developers' applications. At our website, www.macopenglbook.com, we provide our example OpenGL code as well as other OpenGL-related resources. Additionally, we track and provide corrections for any errata and typos. Although we aspire to Knuth-like greatness, we are open to the idea that bugs may yet lurk within these pages. Should you find a possible gaffe, please bring it to our attention through our website.

This book has been a project long in the making, and rumblings of Leopard, Mac OS X 10.5, have been part of our plan since the beginning. However, due to information embargoes, the paucity of information available to the public, and publishing timelines, our best efforts at incorporating final, released Leopard-specific details are thwarted. Although we've accounted for most major changes to OpenGL programming for Leopard in this book, there was still some degree of flux for Leopard features at the time this book was published. Never fear, we've put together a detailed Leopard change synopsis for OpenGL, and accounted for the flux in Leopard on our website in an extra chapter. You'll find this bonus chapter at our website: www.macopenglbook.com.

A few words on Leopard that we can say at this time with authority: First, Leopard will provide OpenGL 2.0 and OpenGL ES support. OpenGL 2.0 is a great baseline for OpenGL developers, providing the most modern of OpenGL foundations upon which to develop. Also of interest is the inclusion of OpenGL ES in this release. ES stands for *embedded system*, and is a nice, stripped-down version of OpenGL, largely targeting handheld devices. At this time, if writing an application for a desktop system, it would still be most sensible to target OpenGL 2.0. However, if you're building and testing a cross-platform device that might be used for handheld devices, OpenGL ES would be a good OpenGL SDK to develop against. Second, Apple's tools for development and debugging are a lot more comprehensive in Leopard. XRay, in particular, integrates a variety of debugging tools in one information view, making it much easier to target certain types of bottlenecks, specifically those involving data transfer. Finally, Leopard brings a lot of bug-fixes and feature enhancements. We've got information on bits and pieces of the Leopard OpenGL throughout the book. But you'll have to read about the final and released version in our Leopard chapter on the website.

So, once you have this book in your hands, please go to the website and get the addendum. We think you'll be pleased with the detail and additional information it offers on the released version of Leopard. We consider it the definitive source of independent information for OpenGL on Leopard, Mac OSX 10.5. Get it by going to: www.macopenglbook.com.