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The first edition of 3D Game Engine Design appeared in print over six years ago　September 2000　. At that time　shader programming did not exist on consumer graphics hardware. All rendering was performed using the fixed-function pipeline　which consisted.

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                Netlmmerse   Gamebryo

        Geometric Tools   Wild Magic

                    Gam

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This chapter provides some basic concepts that occur in a computer graphics system. Some of these concepts are mathematical in nature. I am assuming that you are familiar with trigonometry vector and matrix algebra and dot products and cross products. A warning to those who have a significant mathematical background I intentionally discuss the mathematical concepts in a somewhat informal manner. My goal is to present the relevant ideas without getting tied down in the minutiae of stating rigorous definitions for the concepts. The first edition of this book was criticized for overemphasizing the mathematical details——and rightly so. Learn computer graphics first and then later explore the beauty of formal mathematical exposition

The foundations of coordinate systems Section 2.1 and transformations Section 2.2 are pervasive throughout a game engine. They are found not only in the graphics engines but in the physics engines and sound engines. Getting a model out of a modeling package and into the game world setting up a camera for viewing and displaying the model vertices and triangles is a process for which you must absolutely understand the coordinate systems and transformations. Scene graph management Chapter 4 also requires a thorough understanding of these topics. Sections 2.3 through 2.6 are the foundation for drawing 3D objects on a 2D screen. In a programming environment using graphics APIs such as OpenGL or Direct3D to access the graphics hardware your participation in the process is typically restricted to selecting the parameters of the camera providing the triangle primitives whose vertices have been assigned various attributes and identifying objects that are not within the viewing region so that you do not have to draw them. The low-level processing of vertices and triangles is the responsibility of the graphics drivers. A discussion of the low-level processing is provided in this book and a software renderer is part of the source code so you can see an actual implementation of the ideas. ……

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”   ——Tim Sweeney   Unreal   Epic
  “
”   ——Andrea Pessino   3

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