How to Implement 2D and 3D Graphics in iOS™ Applications

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Class summary

In this class, we talk about and demonstrate iOS libraries for 2D and 3D graphics. We demonstrate the use of native API iOS SDK provides for graphics programming including the Quartz and UIKit SDK, which are useful for 2D graphics. We also introduce the OpenGL library for iOS (called OpenGL ES) as well as GLKit library. Finally, we demonstrate a browser-based graphics application that uses the WebGL technology to display 2D and 3D graphics on a browser running in an Apple device.

Key learning objectives

At the end of this class, you will be able to:

- Implement 2D graphics using the native Quartz and UIKit
- Implement 2D and 3D graphics using OpenGL ES and GLKit
- Implement 2D and 3D graphics for a browser on iOS
- Determine which technologies are best for your graphics needs

2D Graphics

The Quartz 2D Graphics

- Draw on a View or an Image object
- The drawing surface represented by a Context Object
- You can set the Palette like:
  - Pen Color
  - Pen Thickness
  - Background color
  - Background image
- APIs available for 2D primitives, patterns and gradients
- Quartz 2D Programming Guide

3D Graphics with OpenGL ES

OpenGL Architecture (Pipeline)

- Define primitives/image data
- Apply transformations and lighting
- Assemble primitives and clipping
- Apply Textures and Fog
- Commit to framebuffer

OpenGL ES 1.1

- Fixed pipeline for rendering (not very programmable)
- Simpler than 2.0 or 3.0
- Very useful for learning and quick proof of concepts.
- Also useful for simple wireframe and shaded graphics
- Old technology so some devices may not provide hardware support

OpenGL ES 2.0

- Programmable pipeline
- Custom vertex and fragment shaders for better rendering control
- Most popular version currently on mobile devices as of AU 2013

OpenGL ES 3.0

- Enhancements to 2.0 pipeline:
  - Rendering operations
  - Textures
  - Shading language
- Very new specification and library
- Only the latest iOS and Android devices support it
- Support in future devices virtually guaranteed

Web Graphics

WebGL: Browser graphics using Javascript

- Based on OpenGL ES 2.0
- Runs inside a web browser
- Unfortunately, no “official” support for WebGL on iOS
- iOS needs to be jailbroken to use some hacks