OpenGL ES: iPhone and Andoid **CSCI 4239/5239 Advanced Computer Graphics** Spring 2018

Apple iOS Devices

- Supports OpenGL ES 1.1 or 2.0
 - Newer devices support 1.1 AND 2.0
- User interface is Objective C
 - Links to C and C++ code
- Develop with Xcode on Mac only
- Emulator for all devices
 - Slower than native devices
 - Almost perfect emulation

Getting iOS Tools

- Download Xcode from Apple
 - 4GB download
- Provides compiler, frameworks, etc
- Create project in Xcode
- Select target iPhone/iPad
- Emulator launched on run
- Get command line tools also

Android Devices

- Supports OpenGL ES 1.1 or 2.0
 - Newer devices support 1.1 AND 2.0
- User interface is Java
 - Link to C/C++ code with JNI
- Emulator for phones and tablets
 - Slower than native devices
 - OpenGL ES 2.0 emulator much improved

Android Tools

- Download Android Studio
 - https://developer.android.com/studio/
 - About 750MB ZIP file
- Unzip and find studio.sh or studio.exe
- Use Configure to download SDK, NDK
- Add Android tools to PATH
 -/SDK/tools
 -/SDK/platform-tools
 -/SDK/ndk-bundle
- Create AVDs

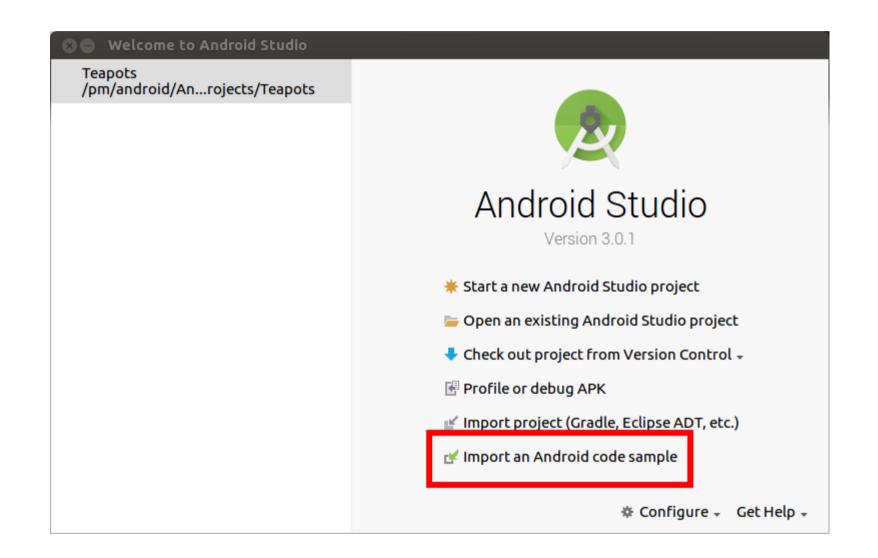
Initial SDK Configuration

Welcome to Android Studio Teapots /pm/android/An...rojects/Teapots Android Studio Version 3.0.1 Start a new Android Studio project Dpen an existing Android Studio project Check out project from Version Control + Profile or debug APK Import project (Gradle, Eclipse ADT, etc.) Manual Manua Manual Manua Manual Manu Configure -Get Help 🚽

Select and install SDK Tools

)	Appearance & Behavior > System Settings > Android SDK		
Appearance & Behavior	Manager for the Android SDK and Tools used by Android Stud	lio	
Appearance	Android SDK Location: /pm/android/SDK	Edi	i <u>t</u>
Menus and Toolbars	SDK Platform: SDK Tools DK Update Sites		
System Settings	Below are the available SDK developer tools. Once installed,	Android Studio will	
Passwords	automatically check for updates. Check "show package deta		
HTTP Proxy	versions of an SDK Tool.		
Updates	Name	Version	Status
	Android SDK Build-Tools		Installed Not Installed
Usage Statistics	CMake		Installed
Android SDK			Not Installed
Notifications	Android Auto API Simulators	1	Not installed
Ouick Lists	Android Auto Desktop Head Unit emulator	1.1	Not installed
Path Variables	Android Emulator	27.1.7 27.0.1	Installed Installed
	 Android SDK Platform-Tools Android SDK Tools 	27.0.1 26.1.1	Installed
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Editor	Google Play APK Expansion library	1	Not installed
Plugins	Google Play Licensing Library	1	Not installed
Build, Execution, Deployment	Google Play services	46	Not installed
	Google Web Driver	2	Not installed Not installed
Tools	☐ Instant App S Development SDK ✓ NDK	1.1.0 16.1.4479499	Installed
	Cuppert Repository	10.1.4779799	mstatted
	 ConstraintLayout for Android 		Update Available: 1
	 Solver for ConstraintLayout 		Update Available: 1
	Android Support Repository	47.0.0	Installed
	Google Repository	58	Installed
			Show Package Det

Import Code Example



Teapots NDK/OpenGL ES 2.0

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Import Sample



Browse Samples Android Studio

Select a sample to import

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Android o preview

Downloadable Fonts (Kotlin)

Connectivity
 Beam Large Files

Content

Scoped Directory Access

Getting started

Wear Verify Remote App

Ndk

Teapots

V UI

Downloadable Fonts Downloadable Fonts (Kotlin) Wear Verify Remote App Teapots is an collection of Android C++ samples that uses a Teapot rendering to demostrate Android NDK platform features: - classic-teapot: Rendering classic teapot mesh using GLES 2.0 API and <u>NativeActivity</u>. - more-teapots: Rendering multiple instances of Classic Teapot with GLES 3.0 Instance Rendering - Choreographer-30fps: demonstrates multiple frame rate throttoling techniques based on API level using Chreographer API and EGL Android presentation time extension. This sample uses the new Android Studio CMake plugin with C++ support.

Tags: ndk

Browse source in GitHub

60.10 FPS

Previous

Next

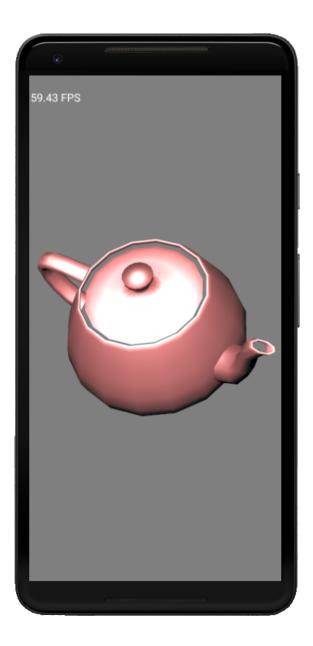
Select Target, Build and Run

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Create Virtual Device using Wizard

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Connected Devices			
Pixel 2 XL API 27 (Android 8.1.0, API 27)			
Create New Virtual Device			
	ОК	Cancel	Help

teapot and more-teapots





Qt Creator

- Xcode lookalike IDE for Qt
- Allows builds for different platforms
 - Desktop
 - iOS
 - Android
- Cross compiles for hardware
- Many examples and tutorials
 - Cube OpenGL ES 2.0

Portable OpenGL ES Code

- Write the bulk of the code in C++
 - OpenGL ES 1.1 will run on all devices
 - OpenGL ES 2.0 will run on newer devices
- Write minimal code in interface language
 - Objective C link to C/C++
 - Java call C/C++ using JNI
- Build code using Qt

Assignment 6

- Create an application that displays a scene in 3D on the iPhone/iPad or Android
 - Build objects yourself
 - Explore advanced features such as lighting, textures, ...
- Groups are permitted
 - Pair up with somebody ahead of the curve
 - Presentations are still individual
 - Volunteer if this is your thing