ANDROID DEVELOPER TOOLS TRAINING
GTC 2014
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AGENDA

- NVIDIA Developer Tools Introduction
- Multi-core CPU tools
- Graphics Developer Tools
- Compute Developer Tools
NVIDIA Developer Tools

Build, Debug and Profile

- Microsoft DirectX
- OpenGL
- NVIDIA CUDA
- OpenGL ES
- Android NDK

IDE integration
- Visual Studio
- Eclipse
- NVIDIA Nsight

Standalone Tools
- Tegra Android Developer Pack
- NVIDIA Developer Tools

Performance Monitoring SDK

Local and Remote Debugging

Hardware Support
- GPU and CPU Performance and Power Monitoring
- GPU Shader and Kernel Debugging and Profiling
GET STARTED in minutes NOT hours or days
INSTALLS all tools required for Tegra Android
CPU DEBUGGING with Nsight Tegra
GPU DEBUGGING with PerfHUD ES/Tegra Graphics Debugger
OPTIMIZE applications with Tegra System Profiler
REFERENCE docs, samples & tutorials
OPTIMIZED for Tegra Android development
FLASHES Tegra DevKit with OS Image
CONFIGURED for debugging and profiling
INCLUDES some Kernel symbols and DS-5 support
TEGRA CPU DEVELOPER TOOLS

CPU DEBUGGING

- Supports Android/Linux standard tools
  - Eclipse/NDK/JDK
  - Android Studio
  - Gdb/gdbserver 7.3.x (Android)

- Nsight® Tegra™ Visual Studio Edition
  - Gdb/Jdb within Visual Studio
NVIDIA® NSIGHT™ TEGRA

Android NDK/JDK application development

Project Management  Android Debugging  Logcat Filtering
NSIGHT TEGRA Visual Studio 1.5

- Microsoft® Visual Studio™ 2013
- NDK r9c / Android SDK 22.3
- Support for external build systems (makefile)
- Improved MSBUILD compatibility with NDK
- Improved project/solution loading performance
Android GDB debugging in Visual Studio

Set breakpoints in both Java and Native (C/C+)

Use the familiar Visual Studio Locals, Watches, Memory and Breakpoints windows.

Build Native Android projects in Visual Studio using vs-android, ndk-build or makefiles.
TEGRA CPU DEVELOPER TOOLS

CPU PROFILING

- Supports Android/Linux standard tools
  - Systrace/atrace/ftrace
  - Perf
    - L1-dcache/icache-load/store/prefetch{-misses}
    - L2cache-dr/dw/instr-misses
  - Oprofile

- ARM DS-5 Gator

- Tegra System Profiler
TEGRA SYSTEM PROFILER

MULTI-CORE CPU PROFILER FOR ALL TEGRA PLATFORMS

- Windows, Linux and OSX host application
- Maximize multi-core A15/A9 CPU utilization
- Quickly identify CPU “hot spots” and “hot paths”
- Quickly identify L1/L2 cache issues
- Easily prepare a device for profiling
- Easily deploy applications for profiling
WHAT’S NEW WITH
TEGRA SYSTEM PROFILER 2.0

- Supports Tegra K1 and Tegra Note 7
- CPU usage broken down by module
- New backtrace options simplify call stack collection
- Improved performance and filtering options
- Supports Linux and OSX in addition to Windows
Identify call chain “hot spots”

Capture multi-core CPU utilization, L1/L2 cache counters
GRAPHICS DEVELOPER TOOLS

- **Nsight Visual Studio Edition**
  - Frame Debugging and Profiling
  - Shader Debugging and Pixel History
  - System trace

- **Tegra Graphics Debugger**
  - Frame Debugging and Profiling
  - Shader Debugging and Pixel History (v2.0)

- **PerfKit**
  - API to sample performance SW and HW counters
NVIDIA® NSIGHT™

HOMOGENEOUS APPLICATION DEVELOPMENT FOR CPU+GPU,
GRAPHICS AND COMPUTE

GPU Shader Debugger
Pixel History

Graphics Inspector and Profiler

System Analysis
GPU Shader Debugging and Pixel history

Fast frame scrubbing and HUD
TEGRA GRAPHICS DEBUGGER

NEXT-GEN GRAPHICS DEVELOPMENT TOOLS FOR TEGRA K1

- Supports OpenGL 4.x, OpenGL ES 2.0/3.0/3.1
  + numerous extensions
- Monitor key software and hardware performance metrics
- Debug draw calls and related states and resources
- Live capture of a single rendering frame
- Edit and recompile shaders live
- Automatic GPU bottleneck analysis
- Advanced timings for draw calls and kernel dispatches
PERFHUD ES 2.2
GRAPHICS DEVELOPMENT TOOLS FOR TEGRA 4 AND PRIOR

- Supports OpenGL ES 1.0 and 2.0
- Monitor key software and hardware performance metrics
- Examine frames to reveal rendering problems
- Debug API calls, parameters, return values and errors
- Execute directed tests to identify bottlenecks
- Edit and apply shaders dynamically at runtime
- Monitor CPU and GPU utilization
PERFKIT 3.1

- GPU and Software Performance Counter API
  - Performance Monitoring
  - Automated bottleneck analysis
  - Graphics and Compute

- Supports Kepler Architecture and higher on Android

http://www.nvidia.com/object/nvperfkit_home.html
COMPUTE DEVELOPER TOOLS

- Nsight Eclipse Edition
  - Integrated CUDA development environment for Linux and MAC
- Nsight Visual Studio Edition
  - Integrated CUDA development environment for Windows
- CUDA 6.0 Toolkit command line tools for Android
- RenderScript Tegra K1 acceleration / No developer tools
NVIDIA® NSIGHT™

HOMOGENEOUS APPLICATION DEVELOPMENT FOR CPU+GPU COMPUTE PLATFORMS
BUILD, DEBUG AND PROFILE ON REMOTE TARGETS WITH CUDA 6.0

CUDA-Aware Editor
CUDA Debugger
CUDA Profiler

CPU+GPU
CUDA 6.0 STANDALONE TOOLS

VISUAL PROFILER
- Trace CUDA activities
- Kernel Profiler
- Performance instrumentation with source code correlation
- Guided Expert Analysis

NVPROF
- Generates execution summary
- Gather Performance events and metrics

CUDA-MEMCHECK
- Out of bounds memory access detection
- Detects Race Condition

CUDA-GDB
- Command line CUDA debugging
- Debug CPU and GPU code
CONCLUSION

- Full Tegra K1 support
- Full OpenGL 4.x and ES 2.0/3.0/3.1
- Full support for Renderscript and CUDA 6.0
- Advanced Visual Studio integration
- Advanced CPU profiling
- Consistent user experience from PC to Tegra Android devices

Many years of discreet PC GPU developer tools experience leverage to provide a smooth user experience!
FINDING MORE INFORMATION...


- https://devtalk.nvidia.com/