Agenda: NVIDIA Parallel Nsight™

- Programmable GPU Development
- Presenting Parallel Nsight
- Demo
- Questions/Feedback
Programmable GPU Development

More programmability = more power, more control and cooler effects!

BUT more power = longer programs…how do I debug this code?

How do I harness this amazing hardware in an environment I am familiar with?
Programmable GPU Development

My scene should look like this...

Image property of Emergent Game Technologies Inc., used by permission
Programmable GPU Development

…but instead looks like this 😞!

How do I...debug my skinning shader?
How do I...

...figure out *what* model led to *which* draw call that produced *some* fragment that was or wasn’t blended properly to produce *this broken pixel!*?!?

...understand why my performance tanks in this room or when a certain character enters the scene?

...and on...and on...and on.
Programmable GPU Development

Fundamental problem:
Scaling from CPU to GPU is immense
and we need tools to make this possible!

- 2-4 cores
- 6-12 concurrent threads
- 256-512 or more cores
- 1000s...10000s concurrent threads
Presenting Parallel Nsight™

GTX480 + Parallel Nsight + Visual Studio

One Killer DirectX Development Environment

**Integrated** into Visual Studio
Powerful and familiar user interface

**Hardware-based** shader debugger
All shader types, including tessellation and compute
No game modifications required

**Full DirectX10/11** frame debugging & profiling
Including Pixel History, with debugger integration

**Combined CPU/GPU** performance tools
CPU and GPU activities on the same correlated timeline
Parallel Nsight Environment

Run remotely for Shader Debugging (GPU halts at breakpoint)
Run locally or remotely for Frame Debugger and Profiling/Tracing
Demo: Launching

1. Launch Nsight Monitor

2. Configure Nsight Project Settings

3. Launch Your Application in Visual Studio
Demo: HUD with Application Running

Configurable Performance Graphs

HUD Toolbar
Demo: HUD in Frame Debugger

- Scrub Bar
- Direct3D Perf Markers
- Render Target Details
Demo: HUD Render Target Zoom

Ctrl Key for Pixel Zoom

Zoom Active Render Target in Place
Demo: Frame Debugger Capture

Nsight performs a real time capture on your running application

Frame information synced between target application and Visual Studio on the host

Captures can be saved for later analysis

Return to application at any time
Demo: Host Frames Page

- Draw Calls
- Dependencies
- Scrub Bar
- Synced Render Target
- Direct3D Perf Markers
Demo: Draw Call Page

- Geometry Preview
- Shader Resources
- Render Targets
- Links to Pipeline Inspectors
Demo: Texture Viewer

- Texture Inspector
- Resource and View Information
- Mipmap Thumbnails
- Zoom in on Mipmaps
Demo: Depth Buffer Viewer

- Web-Like Navigation Bar
- Host Side Scrubber
- Visualize Depth Buffer
- Control Float Remapping via Histogram
Demo: Output Merger State Inspector

Inspect All Direct3D State

View Any Stage in the Direct3D Pipeline
Demo: Pixel History

1. Choose Pixel of Interest

2. See All Fragments

3. Goto Draw Call Info or Debug Actual Fragment
Demo: Shader Debugger Breakpoint

Stopped At Breakpoint In Specified Fragment

Stepping, Run To Cursor

Full Speed, GPU Evaluated Conditionals, Including Local Variables

Visual Studio’s Watch Window Populated
Demo: Shader Debugger Focus

Pixels in Flight
Select Focus Pixel

Change Focus, Locals
Update
Demo: Frame Profiler

- State Buckets: Draw Calls Sharing Common State
- Draw Call Statistics & Link To Draw Call Page
- Multiple Graphs
- Bottleneck Information Per Draw Call
- State Buckets Using Direct3D Perf Markers
Demo: Launching a Trace

- Configure Application Setup
- Select What to Trace
- Launch Your Application
Demo: Trace

System Wide Performance Data

Filter for Areas of Interest
Demo: Trace

CUDA API, Memory Transfers, and Kernel Launch Information

DirectX API Calls

CPU Core Utilization
The Nsight 1.0 Release

A full Visual Studio-integrated development environment

Supports
DirectX11 + DirectCompute, DirectX10, OpenGL, CUDA C, OpenCL

Requires Windows Vista or Windows 7, Visual Studio 2008 SP1
Questions?

http://developer.nvidia.com/nsight