Agenda

- The Spirit of “Designed for CUDA”
- How Do You Design for CUDA
- How “Designed for CUDA” Works
  - Development Partnership
  - Marketing Partnership
- Get “Designed for CUDA”
The Spirit of “Designed for CUDA”
The Spirit of “Designed for CUDA”

A development and marketing partnership to:

- Enable the best use of GPU computing for your app
- Deliver solutions that amaze consumers
- Build and sustain a profitable market for you and NVIDIA
“Designed for CUDA” Program

Development and Testing Collaboration For A Better Overall User Experience

1. Performance optimizations result in powerful GPU/CPU co-processing
2. Stability & reliability via compatibility testing = Fewer returns and support issues
3. Advanced GPU computing rewards & encourages new users of CUDA GPUs

NVIDIA Market Reach and Application Promotions To Build and Grow Market
Designed for CUDA - The Approach

CUDA is
An Architecture

NVIDIA GPU
with the CUDA Parallel Computing Architecture
Designed for CUDA - The Approach

CUDA is Open

NVIDIA GPU
with the CUDA Parallel Computing Architecture
Designed for CUDA - The Approach

Widest Language & API Support For GPU Computing

- **CUDA C**
  - With CUDA Extensions
  - Over 60,000 developers
  - SDK + Lib’s + Visual Profiler and Debugger

- **OpenCL**
  - 1st GPU demo
  - Shipped 1st OpenCL Conformant Driver
  - Strategic developers using NV SW today

- **Direct Compute**
  - Microsoft’s GPU Computing API
  - Supports all CUDA-Architecture GPUs since G80 (DX10 and future DX11 GPUs)

- **FORTRAN**
  - PGI Compiler
  - Fortran wrappers
  - FLAGON

- **Python, Java, .NET, …**
  - Compute Kernels
  - API Bindings

NVIDIA GPU
with the CUDA Parallel Computing Architecture
### Designed for CUDA - The Approach

**Your GPU Computing Application**

<table>
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<tr>
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**NVIDIA GPU**

with the CUDA Parallel Computing Architecture
Designed for CUDA - The Approach

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NVIDIA GPU
with the CUDA Parallel Computing Architecture
Designed for CUDA - The GPU
Over 100 Million CUDA-enabled GPUs Installed

GeForce®
Consumer

Tesla™
HPC | Server

Quadro®
Professional
Designed for CUDA
Reaching Consumers
Program In A Nutshell

NVIDIA Provides to ISV Partner

- Technical info
  - Early access to future products, tech details & roadmaps
- Development support
  - Implementation, optimization, bug fixes to best enable NVIDIA GPU
- Testing support
  - Compatibility testing, min spec analysis
- Marketing programs
  - Targeting 100M+ GPUs

ISV Partner Provides to NVIDIA

- High impact CUDA technology adoption
- App info
  - Tech details, release & update timing
- Early and regular access to builds & updates
- Ongoing GPU computing optimization
- Co-marketing collaboration

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NVIDIA Value Proposition – Development

- **Extensive Technology and Tools**
  - Optimized GPU Computing support
  - Expertise in Video, Imaging, & GPU Computing
  - Advanced graphics feature support
  - Performance optimizations

- **Global Test Lab with Over 800 Systems**
  - Dedicated to pre-release app testing
    Santa Clara, Moscow, Shanghai, Beijing
  - GPU scaling analysis

- **Inside Track Access**
  - NVIDIA developer website [private]
  - File and track bugs
  - Early access: drivers, tools, roadmaps
## NVIDIA Developer Resources

### DEVELOPMENT TOOLS

- **CUDA Toolkit**
  - Complete GPU computing development kit

- **Visual Profiler**
  - GPU hardware profiler for CUDA C and OpenCL

- **Nexus**
  - Development environment with Visual Studio integration [beta]

- **NVPerfKit**
  - OpenGL/D3D performance tools

- **FX Composer**
  - Shader Authoring IDE

### SDKs AND CODE SAMPLES

- **GPU Computing SDK**
  - CUDA C, OpenCL, DirectCompute programming guide and code samples

- **Graphics SDK**
  - DirectX & OpenGL code samples

- **PhysX SDK**
  - Complete game physics solution

- **OpenAutomate**
  - Test automation SDK

### VIDEO LIBRARIES

- **Video Decode Acceleration**
  - NVCUVID
  - DXVA
  - Win7 MFT

- **Video Encode Acceleration**
  - NVCUVENC
  - Win7 MFT

- **Post Processing**
  - Noise reduction / De-interlace / Polyphase scaling / Color process

### ENGINES & LIBRARIES

- **NPP Image Libraries**
  - Performance primitives for imaging

- **Numeric Libraries**
  - cuFFT, cuLA, cuBLAS

- **App Acceleration Engines**
  - Optimized software modules for GPU acceleration

- **Shader Library**
  - Shader and post processing

- **Optimization Guides**
  - GPU computing and Graphics development best practices

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Helping You Reach
Over 100 Million Consumers

Source: Mercury Research, June 2009
“GPU computing may be coming into its own, with the first real consumer-ready apps.”

“...game changing technology”

“Power of parallel computing is amazing.”

“...advantages of GPU-equipped systems will eventually become overwhelming...no longer recommend PCs without GPUs.”

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Co-Marketing Assets

- Banner ad templates
- Print ad templates
- Mouse pad
- Monitor hats
- Shelf talkers
- Poster
- Box flap stickers
Leverage NVIDIA Partner Connections

- Leading OEM’s [ Desktop & Notebook ]
- Over 25 add-in card partners (AIC’s)
- 1,000s of resellers via “Partner Force” program
- Distributors
- Regional System Builders
Co-Market with NVIDIA Partners!

- Promo ads / flyers
- Web banner ads
- Shelf talkers
- Box promo
It’s Your Move

Contact NVIDIA Now
- Email - designedforcuda@nvidia.com

Develop
- Enable the best experience
- Optimize to expand your market
- Ensure stability with advanced testing

Market
- Reach over 100+ million CUDA users
- Tap NVIDIA partners to increase visibility
- Sell via NVIDIA online stores

Contact NVIDIA Now
Email - designedforcuda@nvidia.com
Leveraging NVIDIA’s Massive Testing Resources

San Jose, California | 1 October 2009

John Spitzer | Head of NVIDIA Russia, Sr Director of GTL [Global Test Lab]
Why Do We Need Automation?

- People don’t scale as well as machines
- Reproducibility
- Reduces potential for error
- Faster turnaround time
OpenAutomate

Purpose
- Automation for QA and benchmarking
- Standard for querying/setting application parameters
- Standard for running automated benchmarks

Design goals
- Minimal API, DLL, data structures
- No complex file formats to parse/write
- Virtually no footprint added to application
Benefits

Reduces customer support issues
- Manual testing allows compatibility testing on just a handful of configurations
- Automation allows testing on the full spectrum of configs in NVIDIA’s lab (>500)
- Not just GPU, but CPU, memory, display, OS, etc..

Forward compatibility
- Top-to-bottom testing on pre-release drivers, compilers, runtimes and so on
- Insurance that your game will run well on future GPUs

Comprehensive reports
- Compatibility, but also...
- Suggested minimum specification
- Performance data
Benchmark Requirements

- **Type and length**
  - Key word is “representative” - meaning real-life
  - Too short (less than 30s) and timing error can become significant
  - Too long (more than 15 min) will bog down our farm
  - Many short benchmarks (3 min) is often better than one long (15 min)

- **Deterministic benchmarks are ideal**
  - 2 runs, 1 machine, identical results
  - Even better: 2 runs, 2 machines, identical results
How Does It Work?

- The app is invoked with a command-line arg
- The app call oalnit() with the command-line option
- oalnit() loads a DLL, and binds all the oaXXX funcs
- The app goes into a command-loop, waiting for commands from the DLL
What Are The Possible Commands?

- Enumerate available options
- Get current options
- Set options
- Enumerate available benchmarks
- Run benchmark
- Run application
- Exit
Basic Implementation:

Application
Command-line: app.exe --openautomate OA_plugin.dll;

1. Takes OpenAutomate command-line and starts initialization of OA:
oaVersion Version;
oainit((const oaString)OAOpt, &Version);

3. Enters OA command loop:
oainitCommand(&Command);
switch(oaGetNextCommand(&Command))

6. Once OA_CMD_EXIT command is received, the application exits

OA_plugin.dll

2. Initializes and returns function pointers for callbacks

4. DLL sends OA command stream to app:
   OA_CMD_GET_ALL_OPTION
   OA_CMD_GET_CURRENT_OPTIONS
   OA_CMD_SET_OPTIONS
   OA_CMD_GET_BENCHMARK
   OA_CMD_RUN_BENCHMARK
   OA_CMD_RUN

5. Eventually the DLL will send the OA_CMD_EXIT command.
Submission Checklist

- No installation (‘copy and run’), silent if former isn’t possible
- Provide the entry point exe name
- No licensing needed (or if necessary, unlimited licenses with clear instructions on how to do so)
- Full OA conformance (with conformance log)
- At least 1 benchmark exposed in OA, no longer than 15 minutes in length
- No user interaction should be required while in OA mode
- Barring major errors, the application should never exit by itself unless OA_CMD_EXIT is received
- Make sure to call oaStartBenchmark and oaEndBenchmark in appropriate places
Call to Action

- Increase your testing coverage by 100x
- Insure compatibility with future drivers and GPUs
- It’s easy to implement
- OpenAutomate is now public! [http://openautomate.com](http://openautomate.com)
- E-mail: OpenAutomate-Support@nvidia.com
Thank You