Visual Computing is our singular mission
NVIDIA, DESIGNWORKS

RENDERING

Iray SDK
OptiX SDK
MDL SDK
NV Pro Pipeline
vMaterials

PHYSICS

PhysX

VOXELS

GVDB Voxels
VXGI

VIDEO

GPUDirect for Video
Video Codec SDK

MANAGEMENT

GRID SW MGMT SDK
NVAPI/NVWMI

DISPLAY

Multi-Display
Capture SDK
Warp and Blend

https://developer.nvidia.com/designworks
End-Users (Designers, Artists, Scientists)

Application Partners

Tools and technologies for Professional Visualization Application Developers

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GRAPHICS DRIVER

CUDA DRIVER

NVIDIA GPU
IRAY SDK

Rendering by simulating the physical behavior of lights and materials

- **Use Case:** physically based rendering for product design
- Unprecedented visual quality and fidelity; enabling fluid and interactive product design flow
MDL SDK

*Material Definition Language for seamless and quick integration of physically based materials into renderers*

- **Use Case**: physically based rendering for product design
- Enables designers and artists to understand how materials impact product design

MDL SDK 2017

developer.nvidia.com/mdl-sdk
vMaterials

*Library with hundreds of ready to use real world materials*

- **Use Case**: physically based rendering for product design
- Library of verified materials for customers to use with MDL enabled renderers

[developer.nvidia.com/vmaterials](http://developer.nvidia.com/vmaterials)
OPTIX RAY-TRACING ENGINE

CUDA accelerated framework for high performance programmable ray-tracing

- **Use Case:** Ray tracing for design, defense, and audio synthesis applications

- OptiX does the “heavy lifting” of ray tracing: traversal, intersection, acceleration, allowing you to concentrate on rendering technique

developer.nvidia.com/optix
NVIDIA Pro Pipeline

Example high performance rendering pipeline

- **Use Case:** OpenGL or Vulkan viewport rendering
- Modularized architecture for reuse in custom rendering pipelines
- Open-Source project lead by NVIDIA

developer.nvidia.com/nvidia-pro-pipeline
VOXELS
VXGI

An implementation of a global illumination algorithm known as Voxel Cone Tracing

- **Use Case**: Professional Rendering applications with heavy geometry
- Adding Global illumination to your scene improves the realism of rendered images
- Reduces Content creation time
GVDB VOXELS SDK
Framework for simulation, compute and rendering of sparse voxels on the GPU

• **Use Case:** Process Engineering, 3D Printing, Motion Pictures and Scientific simulations

• Inspired by Academy Award-winning OpenVDB library, GPU accelerated Voxel computing.

• The finished part has a specific shape, while the internal voronoi can vary in cell density
PHYSICS
PHYSX SDK
Engine to generate realistic Physical effects with HW accelerated physics simulation

- **Use Case:** Real-time product design investigation
- Scalable, multi-platform solution supporting wide range of devices
- Enabled Haptic Feedback for OPTIS’S Virtual build process simulator, Dental training simulation systems - understand difference between collision with a tooth or the gum.
VIDEO
VIDEO CODEC SDK
API for GPU-accelerated Video Encode and Decode

GAME STREAMING (GEFORCE Now) - ULTRA LOW LATENCY
Interactive, single frame latency, 4K, HDR

GPU VIRTUALIZATION - QUALITY & RELIABILITY
Capture + encode, low-latency, multiple display, lossless

VIDEO TRANSCODING - PERFORMANCE/WATT
Codecs, resolution, quality, bitrate, Live, broadcast

VIRTUAL REALITY - ACCURACY
Video frame interpolation (ASW), Camera stitching, Computer Vision applications

Video Codec SDK 8.0

developer.nvidia.com/video-codec-sdk
VIDEO CODEC SDK

Decode HW*

- Formats:
  - MPEG-2
  - VC1
  - VP8
  - VP9
  - H.264
  - H.265

- Bit depth:
  - 8 bit
  - 10 bit
  - 12 bit

- Color**
  - YUV 4:2:0
  - YUV 4:4:4
  - Lossless

- Resolution
  - Up to 8K***

Encode HW*

- Formats:
  - H.264
  - H.265

- Bit depth:
  - 8 bit
  - 10 bit
  - 12 bit

- Color**
  - YUV 4:4:4
  - YUV 4:2:0
  - Lossless

- Resolution
  - Up to 8K***

* See support diagram for previous NVIDIA HW generations
** 4:2:2 is not natively supported on HW
*** Support is codec dependent

Formats:
- MPEG-2
- VC1
- VP8
- VP9
- H.264
- H.265

Bit depth:
- 8 bit
- 10 bit
- 12 bit

Color**
- YUV 4:2:0
- YUV 4:4:4
- Lossless

Resolution
- Up to 8K***
GPUDIRECT FOR VIDEO
Transfer video in and out of GPU memory

• For IO board manufacturers who write device drivers
• Stream video in and out of GPU memory at sub-frame transfer times
• OpenGL, DirectX and CUDA on Windows or Linux

developer.nvidia.com/gpudirectforvideo
DISPLAY
MOSAIC
Multi-display scaling and synchronization

- **Use Case:** Create a stereoscopic 3D CAVE, build an expansive digital signage wall
- Connect up to 16 displays from a single workstation

developer.nvidia.com/capture-sdk
CAPTURE SDK
High quality low latency capture

- **Use Cases:** Streaming, Remoting and broadcasting applications
- Enables developers to easily and efficiently capture and optionally encode display content or application’s graphics context
- Capture up to 8K resolution

[VMware Horizon Blast](http://developer.nvidia.com/capture-sdk) uses NVIDIA Capture SDK to increase number of users per server through improved latency, reduced bandwidth and lower CPU utilization.
WARP AND BLEND
Framework that allows display applications to combine multiple projectors to one single display.

- **Use Case:** Immersive VR, multi-projection display walls, simulator environment for interactive presentations, projection mapping onto scale physical models
- Adjust geometry and intensity for multi-projector systems
- Minimal performance delay to display pipeline compared to external boxes using FPGAs

Simulator environment with large curved front displays
*Image courtesy of Joachim Tesch, Max Planck Institute for Biological Cybernetics.*

developer.nvidia.com/warp-and-blend
MANAGEMENT
NVIDIA WMI SDK
Remotely control NVIDIA Quadro, GRID and NVS GPUs.

- For Windows IT admins to remotely perform administrative tasks.
  - Configure GPU settings
  - Retrieving GPU information
  - Perform automated tasks

developer.nvidia.com/nvwmic-sdk
GRID SW MANAGEMENT SDK
Build monitoring and management solutions optimized for NVIDIA GRID

- Real-time vGPU utilization data
- Manage the lifecycle of a VDI deployment
- Monitor the performance of GPU-accelerated VDI environments

Available on compatible NVIDIA GRID-certified servers with Tesla M6, M10, or M60

developer.nvidia.com/grid-software-management-sdk
ADDITIONAL SDKs

Amazing virtual reality experiences
developer.nvidia.com/vrworks

Cutting-edge technology for game development
developer.nvidia.com/gameworks
DESIGNWORKS - GTC 2017

S7454 - NVIDIA ADVANCED RENDERING
S7236 - RAYTRACING INTERIORS FOR STILLS AND VR WITHIN MINUTES WITH IRAY INTERACTIVE
S7357 - WARPING & BLENDING FOR MULTI-DISPLAY SYSTEM USING NVIDIA DESIGNWORKS
S7352 - SEE THE BIG PICTURE: HOW TO BUILD LARGE DISPLAY WALLS USING NVIDIA DESIGNWORKS APIS/TOOLS
S7455 - INTRODUCTION TO THE NVIDIA OPTIX RAY TRACING ENGINE
S7583 - HOMETBYME: HOW IRAY, VCA, DEEP LEARNING AND VR HELPS YOU EXPERIENCE YOUR NEW APARTMENT BEFORE IT IS BUILT
S7453 - NVIDIA ADVANCED RENDERING PRODUCTS FOR END USERS
S7194 - LIGHT BAKING WITH IRAY
S7440 - CREATE HIGH-QUALITY MATERIALS FROM SCANS WITH MDL AND SUBSTANCE
S7810 - ACCELERATION OF MULTI-OBJECT DETECTION AND CLASSIFICATION TRAINING PROCESS WITH NVIDIA IRAY SDK (PRESENTED BY SAP)
S7328 - THE NVIDIA IRAY LIGHT TRANSPORT SIMULATION AND RENDERING SYSTEM
L7109 - NVIDIA GRID DEPLOYMENT
S7756 - INDUSTRIAL-GRADE HAPTICS WITH HAPTX AND PHYSX
S7424 - INTRODUCTION AND TECHNIQUES WITH NVIDIA GVDB VOXELS
S7425 - 3D PRINTING WITH NVIDIA GVDB VOXELS
S7111 - NVIDIA VIDEO TECHNOLOGIES AND SDK: OVERVIEW AND LATEST UPDATES
QUESTIONS?