A HISTORIC MOMENT

FILM PRODUCTION COMPUTE

1990  2000  2010  2020
A HISTORIC MOMENT

FILM PRODUCTION COMPUTE

CPU PERFORMANCE

1990 2000 2010 2020
A HISTORIC MOMENT
THE ROAD TO REAL-TIME PHOTOREAL

GEOMETRY
Reins
THE ROAD TO REAL-TIME PHOTOREAL

GEOMETRY

PHOTOGRAHAMETRY

Rens
THE ROAD TO REAL-TIME PHOTOREAL
THE ROAD TO REAL-TIME PHOTOREAL
THE ROAD TO REAL-TIME PHOTOREAL
THE ROAD TO REAL-TIME PHOTOREAL
THE HOLY GRAIL OF COMPUTER GRAPHICS

Turner Whitted
1979
“Multi-bounce Recursive Ray Tracing”
1.2 Hours for 512x512 on VAX 11/780
NVIDIA RTX TECHNOLOGY
Announced at GDC, March 2018
ANNOUNCING QUADRO RTX
WORLD’S FIRST RAY TRACING GPU

RTX Family
Up to 10 Giga Rays/sec
Up to 16 TFLOPS + 16 TIPS
Up to 500 Trillion Tensor Ops/sec
Up to 100 GB/sec with NVLink
NEW TURING GPU
GREATEST LEAP SINCE 2006 CUDA GPU

A Step-function Jump in Realism
New Hybrid Rendering Model
Interoperable Rasterization, Ray Tracing, Compute, and AI
Amazing for Today’s — Awesome for Tomorrow’s Content
GIANT LEAP

PASCAL
- 13 TFLOPS FP32
- 50 TOPS INT8
- 11.8 Billion xtors | 471 mm² | 24 GB 10GHz

TURING
- 16 TFLOPS FP16
- 500 TOPS INT4
- 13 TFLOPS FP32
- 50 TOPS INT8
- 18.6 Billion xtors | 754 mm² | 48+48 GB 14GHz

TENSOR CORE
- 125 TFLOPS FP16
- 250 TOPS INT8
- 500 TOPS INT4

RT CORE
- 10 Giga Rays/Sec

SHADER | COMPUTE

16 TFLOPS + 16 TIPS
NVIDIA RTX
NEW GENERATION OF HYBRID RENDERING
Interoperability Between Rasterization, Ray Tracing, Compute, AI
New Turing Ray Tracing Acceleration in OptiX, DXR, Vulkan
New NGX SDK for DNN Plug-Ins
New NVIDIA MDL Materials Open Source
New Support for Pixar Universal Scene Description (USD)
TURING OPENS $250B VISUAL EFFECTS INDUSTRY

DESIGN
DCC
AEC
VISUALIZATION
FILM & TELEVISION
“Real-time ray tracing is here years before anyone thought possible and it’s going to completely change how artists and designers work.”

- Tim Sweeney, CEO, Epic Games
TURING 6X PASCAL
EPIC UE4 RTRT ENGINE
MICROSOFT DIRECTX RAY TRACING

PASCAL | R  | S  | RT  | Time
--- | --- | --- | --- | ---
     | 308 ms
PASCAL | R  | S  | RT  | Time
     | 576 ms
TURING 6X PASCAL

EPIC UE4 RTRT ENGINE
MICROSOFT DIRECTX RAY TRACING

PASCAL

TURING

R S RT

RT

45 ms

576 ms

86 ms

DLAA

DLAA
NVIDIA DLAA
BREAKTHROUGH IN HIGH-QUALITY MOTION IMAGE GENERATION

Temporally Stable Convolutional Autoencoder
-500 Billion FP16 Ops

Ground Truth
64 Jittered Sample Rendering Blended
“Turing’s real-time ray tracing and AI capabilities will literally change our cities of the future.”

- Cobus Bothma, KPF
AUTODESK ARNOLD
ACCELERATED BY NVIDIA RTX
ANNOUNCING NVIDIA RTX SERVER
PRODUCTION RENDERING WITH GLOBAL ILLUMINATION

Powered by Quadro RTX 8000
Ray Traced Global Illumination up to 96 GB Scenes
Remoting and Multi-GPU Virtualization with New Quadro Infinity
Rendering Time Reduced from Hours to Minutes
Q4 Early Access - Q1 GA
TODAY’S RENDER FARM

240 Dual 12-core Skylake CPU Servers
144 kW
$2M Render Farm
NVIDIA RTX SERVERS
A FRACTION OF THE COST

4 RTX 8-GPU Servers
13 kW
$500,000

1/4 the Cost       1/10 the Space       1/11 the Power
NVIDIA RTX SERVERS
A 3-SECOND SHOT IN AN HOUR

4 RTX 8-GPU Servers
13 kW
$500,000

4X Performance       1/3 the Space       1/3 the Power
“We never expected to see results this dramatic. This will completely change how our artists work.”

- Michele Sciolette, CTO, Cinesite
NVIDIA RTX ADOPTION
DESIGN | DCC | AEC
VISUALIZATION | FILM & TV
ANNOUNCING QUADRO RTX
WORLD’S FIRST RAY TRACING GPU

RTX 5000  16 GB / 32 GB  6 Giga Rays/sec  $2,300
### ANNOUNCING QUADRO RTX

**WORLD’S FIRST RAY TRACING GPU**

<table>
<thead>
<tr>
<th>Model</th>
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<th>Price</th>
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ANNOUNCING QUADRO RTX
WORLD’S FIRST RAY TRACING GPU

RTX 5000  16 GB / 32 GB  6 Giga Rays/sec  $2,300
RTX 6000  24 GB / 48 GB  10 Giga Rays/sec  $6,300
RTX 8000  48 GB / 96 GB  10 Giga Rays/sec  $10,000
NVIDIA TURING — GRAPHICS REINVENTED

TURING
“RTRT 6X Pascal”

QUADRO RTX 8000 / 6000 / 5000
“World’s First Ray Tracing GPU”

QUADRO RTX SYSTEMS
“7 Shots a Day”

$250B VISUAL EFFECTS INDUSTRY
“Turing Does Photoreal VFX!”