“THE HOLY GRAIL” OF GRAPHICS
SIMULATING LIGHT RAYS

Turner Whitted | 1979
“Multi-bounce Recursive Ray Tracing”
1.2 Hours for 512x512 on VAX 11/780
THE GPU REVOLUTION

GPU PERFORMANCE

CPU PERFORMANCE

1990  2000  2010  2020

GeForce 3

GTX 8800

GTX 1080

GeForce 256

GeForce 256

GTX 1080
NVIDIA RTX
GRAPHICS REINVENTED

MDL
OptiX | DXR | Vulkan
Rasterization | Ray Tracing | Compute | AI
NVIDIA RTX TECHNOLOGY
ANNOUNCED AT GDC, MARCH 2018
ANNOUNCED AT GDC, MARCH 2018

NVIDIA RTX TECHNOLOGY
REVOLUTIONARY NEW GAME MACHINE

3,000 Easy Payments of $19.95*

CALL 1-889-789-2080
TURING BUILT FOR RTX

GREATEST LEAP SINCE 2006 CUDA GPU

- Turing SM
  - 14 TFLOPS + 14 TIPS
  - Concurrent FP & INT Execution
  - Variable Rate Shading

- Tensor Core
  - 110 TFLOPS FP16
  - 220 TOPS INT8
  - 440 TOPS INT4

- RT Core
  - 10 Giga Rays/sec
  - Ray Triangle Intersection
  - BVH Traversal
TURING BUILT FOR RTX

DGX 4-VOLTAS

55 ms
TURING BUILT FOR RTX

DGX 4-VOLTAS: RT 55 ms
TURING: RT 45 ms
TURING BUILT FOR RTX

<table>
<thead>
<tr>
<th></th>
<th>RT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DGX 4-VOLTAS</td>
<td>RT</td>
<td>55 ms</td>
</tr>
<tr>
<td>TURING</td>
<td>RT</td>
<td>45 ms</td>
</tr>
<tr>
<td>PASCAL</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RT</td>
<td>308 ms</td>
</tr>
</tbody>
</table>
A NEW STANDARD OF PERFORMANCE

1 TURING FRAME

- RAY TRACING
- INT32 SHADING
- FP32 SHADING
- DNN PROCESSING
A NEW STANDARD OF PERFORMANCE
A NEW STANDARD OF PERFORMANCE

14 FP32 TFLOPS

//

110 TFLOPS

(10 TFLOPS PER GIGA RAY)

1 TURING FRAME

RAY TRACING

INT32 SHADING

FP32 SHADING

DNN PROCESSING
A NEW STANDARD OF PERFORMANCE

1 TURING FRAME

RAY TRACING

INT32 SHADING

FP32 SHADING

DNN PROCESSING

14 FP32 TFLOPS

110 TFLOPS

(10 TFLOPS PER GIGA RAY)

14 FP32 TFLOPS

14 INT32 TFLOPS

14 INT32 TIPS
A NEW STANDARD OF PERFORMANCE

14 FP32 TFLOPS
110 TFLOPS
(10 TFLOPS PER GIGA RAY)

14 FP32 TFLOPS
+ 14 INT32 TIPS

110 FP16 TENSOR FLOPS

78T RTX-OPS
RT CORE RAY TRACING ACCELERATOR
“Turing improves raytracing up to 6X compared to Volta... Insane workloads still manageable.”
- Colin Barré-Brisebois and Henrik Halén – SIGGRAPH 2018
NVIDIA RTX
GRAPHICS REINVENTED

MDL

OptiX | DXR | Vulkan

Rasterization | Ray Tracing | Compute | AI
MAGIC OF DEEP LEARNING

COLORIZE IMAGES
UC Berkeley

SEGMENTATION
NVIDIA

COLORIZING HAIR
L’Oreal

SUPER RESOLUTION
NVIDIA

CLARA MEDICAL IMAGING
NVIDIA

SKETCH 2 FACE
NVIDIA
MAGIC OF DEEP LEARNING

COLORIZE IMAGES
UC Berkeley

SEGMENTATION
NVIDIA

COLORIZING HAIR
L’Oreal

SUPER RESOLUTION
NVIDIA

CLARA MEDICAL IMAGING
NVIDIA

SKETCH 2 FACE
NVIDIA

Muhammad Ali Photo: John Rooney/AP; color modification: Richard Zhang
MAGIC OF DEEP LEARNING

COLORIZE IMAGES
UC Berkeley

SEGMENTATION
NVIDIA

COLORIZING HAIR
L’Oreal

SUPER RESOLUTION
NVIDIA

CLARA MEDICAL IMAGING
NVIDIA

SKETCH 2 FACE
NVIDIA

Muhammad Ali Photo: John Rooney/AP; color modification: Richard Zhang
MAGIC OF DEEP LEARNING

COLORIZE IMAGES
UC Berkeley

SEGMENTATION
NVIDIA

COLORIZING HAIR
L’Oreal

SUPER RESOLUTION
NVIDIA

CLARA MEDICAL IMAGING
NVIDIA

SKETCH 2 FACE
NVIDIA

Muhammad Ali Photo: John Rooney/AP; color modification: Richard Zhang
MAGIC OF DEEP LEARNING

COLORIZE IMAGES
UC Berkeley

SEGMENTATION
NVIDIA

COLORIZING HAIR
L’Oreal

SUPER RESOLUTION
NVIDIA

CLARA MEDICAL IMAGING
NVIDIA

SKETCH 2 FACE
NVIDIA

Muhammad Ali Photo: John Rooney/AP; color modification: Richard Zhang
TENSOR CORE DNN PROCESSOR

Convolutional Networks
- Encoder/Decoder
- ReLu
- BatchNorm
- Concat
- Dropout
- Pooling

Recurrent Networks
- LSTM
- GRU
- Beam Search

Generative Networks
- WaveNet
- CTC
- Attention

Reinforcement Learning
- DQN
- Simulation
- DDPG

New Species
- Capsule Nets
- Mixture of Experts
- Neural Collaborative Filtering
- Block Sparse LSTM

Reinforcement Learning
- DQN
- Simulation
- Mixture of Experts
- Neural Collaborative Filtering
- Capsule Nets

New Species
- Capsule Nets
- Mixture of Experts
- Neural Collaborative Filtering
- Block Sparse LSTM
- Capsule Nets
NVIDIA DLSS

BREAKTHROUGH IN HIGH-QUALITY MOTION IMAGE GENERATION

Temporally Stable Convolutional Autoencoder
- 500 Billion FP16 Ops

Ground Truth
Super High Quality Image
64 Jittered Sample Rendering
NVIDIA NGX

NEURAL GRAPHICS FRAMEWORK FOR AI IMAGE PROCESSING

GENERATE GROUND TRUTH

TRAIN AI MODEL

TEST & OPTIMIZE

NGX WORKFLOW CREATES AI MODELS
NVIDIA DGX-2
THE LARGEST GPU EVER CREATED

- 16x Tesla V100 32GB
- 12x NVSwitch
- NVLink Plane Card
- 8x EDR IB/100 GigE
- 2x Xeon Platinum
- 1.5TB System Memory
- PCIe Switch Complex
- 30TB NVME SSDs

2 PFLOPS | 512GB HBM2 | 10 kW | 350 lbs
БЕЛЯШ МА-9
Способ принадлежности: Военное производство СССР
Цель: Сжигание минной сети и дезинсекция территорий от вредителей. Работа в полном темноте позволяет минировать подпольные пещеры, карьеры, тоннели и шахты. Диаметр мины 60 см, вес 41 кг. Экипаж в составе 3-4 человека.
EARLY ACCESS STARTS SEPTEMBER 4

AVAILABLE FOR EVERYONE SEPTEMBER 6
RTX GAMES COMING SOON

- Ark: Survival Evolved
- Assetto Corsa Competizione
- Atomic Heart
- Battlefield V
- Control
- Dauntless
- In Death
- Entitled
- Final Fantasy XV
- The Forge Arena
- Fractured Lands
- Hitman 2
- Justice
- JX3
- Mechwarrior V: Mercenaries
- Metro Exodus
- PlayerUnknown's Battlegrounds
- Remnant from the Ashes
- Serious Sam 4: Planet Badass
- Shadow of the Tomb Raider
- We Happy Few
ANNOUNCING GEFORCE RTX
GEFORCE RTX

RTX 2070
6 Giga Rays/s
45T RTX-OPS
8 GB

RTX 2080
8 Giga Rays/s
60T RTX-OPS
8 GB

RTX 2080 Ti
10 Giga Rays/s
78T RTX-OPS
11 GB
GEFORCE RTX

from

$499
GEFORCE RTX

preorder
TODAY!
GEFORCE RTX

on-shelf

September 20
NVIDIA RTX FAMILY

QUADRO RTX 8000 (DUAL)
48+48 GB | 166T RTX-OPS | 20 GIGA RAYS

$20,000

GEFORCE RTX 2080Ti
11GB | 78T RTX-OPS | 10 GIGA RAYS

FROM $999

GEFORCE RTX 2080
8GB | 60T RTX-OPS | 8 GIGA RAYS

FROM $699

GEFORCE RTX 2070
8GB | 45T RTX-OPS | 6 GIGA RAYS

FROM $499
HUGE LEAP

RTX 2080Ti
RTX 2080
RTX 2070
GTX 1080Ti
GTX 1080

PASCAL  TURING

RTX-OPS
GRAPHICS REINVENTED

NVIDIA RTX
REAL-TIME RAY TRACING
HYBRID GRAPHICS
RASTERIZATION, RAY TRACING, COMPUTE, AND AI

TURING
78T RTX-OPS

GEFORCE RTX 20 SERIES
STARTING FROM $499
AVAILABLE FROM SEPT. 20