What is Ray Tracing?

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Many RTX and GTX cards support Ray Tracing (ray tracing) technology, but do you really know what it is? This new lighting technique takes up a lot of resources on the computer, so only the latest and best graphics cards can handle it.

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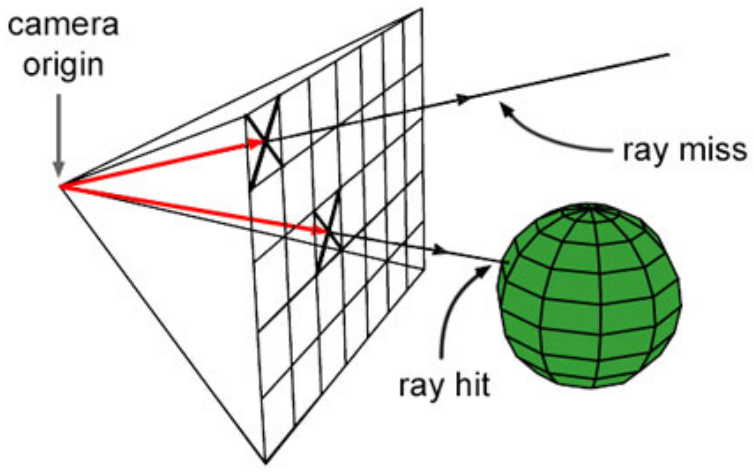
Virtual photon

Graphics technology is often difficult to explain, but Ray Tracing is quite simple. It tries to simulate how light works in the real world. Instead of producing pre-designed lighting for game scenes, Ray Tracing traces the simulation light, or millions of simulation lights or photons. Light bounces off objects as it moves and interacts with attributes of the object. For example, if light bounces off a glossy green surface, its color may vary.



Ray Tracing is quite simple

It's basically the way light works in real life. A particle of light emits from the origin and moves until it interacts with an object, at which point the path of the light particle is determined by the properties of the object. It can be absorbed by a dense, dark object or almost completely reflected by a mirror.

The basic similarity of Ray Tracing technology to real life makes it an extremely realistic 3D rendering technique, even making games like Minecraft look almost realistic in the right conditions.

The only problem is that it is very difficult to simulate. Replicating the way light really works in a very complex, resource-intensive world requires a lot of computing power. Even Nvidia's Ray Tracing rendering technology isn't really Ray Tracing. Instead, it uses some clever approximation calculations to provide something for the same visual effect, but not quite heavily on hardware.

Most Race Tracing games today use a combination of traditional lighting techniques, commonly known as rasterization and ray tracing on specific surfaces, like reflective pools and metal. Battlefield V is a great example of that.

Race Tracing can also be used for shadow areas to make them look more vivid and realistic. You will see that is used to create great effects in Shadow of the Tomb Raider.

Some games use Global Illumination technology (which applies Race Tracing effectively to the whole scene), is expensive and requires the most modern graphics cards to work properly. Currently Metro Exodus uses it, but its implementation is not perfect.

Therefore, measures such as real-time ray tracing (Ray tracing shadows) or reflective surfaces are very common. Other Nvidia technologies like noise reduction and Deep Learning Super Sampling (DLSS) are also being used to improve performance and mask some of the visual glitches that result from less visible rays than necessary. . They are still reserved for pre-built photos and movies, where high-capacity servers spend days displaying individual frames.

Rear hardware

Generation of Nvidia's RTX graphics cards has introduced hardware made specifically for this technique

To handle even the relatively modest implementations of Race Tracing, Nvidia's RTX generation of graphics cards introduced hardware made specifically for this technique. The Turing architecture uses Nvidia's RT Core to process Race Tracing in real time. However, they are not strictly necessary for Race Tracing, as ray tracing effects can run on GTX 10-Series and 16-Series graphics cards, although they are far less capable than RTX cards. top 2070, 2080 and 2080 Ti, all with RT Core.

What about AMD?

Neon Noir shows a high level of Race Tracing effect on AMD RX Vega 56

As of now, AMD graphics cards don't offer any Race Tracing acceleration, but that doesn't mean they can't do it. Crytek released a demo called Neon Noir in 2019, showing the high-level Race Tracing effect on AMD RX Vega 56 worth $ 300, running at a smooth 30 FPS. Not excellent, but proving it is possible.

The RX 5700 XT and Radeon VII are much faster than the Vega 56 and can deliver better frame rates. When AMD launches the long-rumored graphics card 'Big Navi' in late 2020, it will be much better.

Hope to be able to see Race Tracing with dedicated hardware support in both next generation consoles from Microsoft and Sony. Both systems will use AMD Navi graphics technology, so Big Navi may be just a hint of what the official GPU Race Tracing will achieve by the end of 2020.