

## NVIDIA Announces GameWorks DX12

### NVIDIA Brings World's Most Advanced Real-Time Simulation and Rendering Technologies to DX12, Raising Game Realism to New Levels

GDC 2017 -- NVIDIA today announced GameWorks™ DX12, a collection of resources for game developers that will increase realism and shorten product cycles in titles designed using DirectX 12, Microsoft's API that unifies graphics and simulation.

These resources include updates to the [NVIDIA GameWorks SDK](#) for creating interactive cinematic experiences on PC games; updates to the [NVIDIA VRWorks™ SDK](#) for creating immersive virtual reality experiences; new developer tools; and a new [Game Ready Driver](#).

Together, they provide developers with substantial performance gains, multiple new rendering and simulation effects, and other capabilities to help create games optimized for DirectX 12.

"We have invested over 500 engineering-years of work to deliver the most comprehensive platform for developing DirectX 12 games, including the world's most advanced physics simulation engine," said Tony Tamasi, senior vice president of content and technology at NVIDIA. "These resources will ensure that GeForce gamers can enjoy the very best game experience on DirectX 12 titles, just as they have on DirectX 11 games."

"NVIDIA's commitment to DirectX 12 is clear," said Cam McRae, technical director at the Coalition, developers of Gears of War 4. "Having them onsite during the development of Gears of War 4 was immensely beneficial, and helped us to deliver a game that is fast, beautiful and stable."

"NVIDIA creates stunning special effects that run in real time on a PC and provides them to game developers," said Hajime Tabata, division executive of Square Enix. "A lot of the visual magic you see in video games today is a direct result of NVIDIA's work behind the scenes. They are providing an invaluable combination of source code, tools, technology and the engineering effort it takes to help developers implement them. The advancement that we are trying to create through this collaboration is not simply about an evolution in visual appearance, but also to use new technology to create new user experiences."

#### GameWorks Physics Simulation Comes to DX12

The latest version of GameWorks builds on the over 2 million lines of documented code that are available to developers, providing them with a huge range of rendering and simulation effects. GameWorks technologies are currently used in more than 1,000 titles.

DirectX 12 introduced asynchronous compute, which unified graphics and simulation by allowing GPUs to run non-graphics workloads for effects such as post-processing, lighting and physics. But these effects are currently limited because most games can only allocate a few milliseconds to run these types of non-graphical simulations while still delivering smooth gameplay.

To maximize the efficiency of asynchronous compute for gaming effects, NVIDIA introduced the world's most advanced real-time physics simulation engine to DX12, with two technologies that take advantage of asynchronous compute:

- NVIDIA Flow 1.0 -- a visual effects library that provides simulation and volume rendering of dynamic, combustible fluid, fire and smoke. Supports both DirectX 12 and 11.
- NVIDIA FleX 1.1 -- a unified particle-based simulation technique for real-time visual effects. Supports DirectX 12 compute.

FleX and Flow are available immediately for free to registered developers.

GameWorks updates also include NVIDIA HairWorks 1.3, a library that enables developers to simulate and render realistic fur and hair for their games. Version 1.3 supports DirectX 12 and is also available immediately.

#### VRWorks Comes to DirectX 12

VRWorks includes APIs, libraries and features that enable headset and application developers to achieve a new level of immersion in VR. It has been updated to support DirectX 12 with better performance, lower latency and plug-and-play compatibility. It will be supported in the Unity 2017.1 beta, which ships this spring, and the Unreal Engine 4 game engines -- thus covering a majority of game development platforms.

#### World's Most Advanced DirectX 12 Developer Tools

NVIDIA also introduced several developer resources created to improve DirectX 12 game development, including:

- NVIDIA Aftermath 1.0 -- a diagnostic utility that developers can use for analyzing DirectX 12 error reports.
- Nsight™ Visual Studio Edition 5.3 -- a tool that lets developers debug and profile VR and DirectX 12 applications in real time. Includes support for the Oculus, OpenVR (HTC Vive) and DirectX 12 APIs.
- PIX Plug-in -- PIX is a DirectX 12 debugging tool developed by Microsoft. NVIDIA collaborated with the Microsoft PIX team to expose NVIDIA GPU Performance Counters to PIX for Windows via a PIX Plug-in.

#### Game Ready Driver Optimized for DX12

NVIDIA also revealed an upcoming Game Ready Driver optimized for DirectX 12 games. The company refined code in the driver and worked side by side with game developers to deliver performance increases of up to 16 percent on average across a variety of DirectX 12 games, such as Ashes of the Singularity, Gears of War 4, Hitman, Rise of the Tomb Raider and Tom Clancy's The Division.<sup>(1)</sup>

Since the first launch of its [Pascal™ architecture](#) -- the world's most advanced DX12 GPU family, including the performance-leading [GeForce GTX 1080 Ti](#)® and GTX 1080 GPUs -- NVIDIA has continuously improved DX12 game performance through releases of Game Ready drivers. The drivers are timed with the release of the latest games by leading partners.

More information on NVIDIA's developer resources, including GameWorks and DirectX 12 developer tools, are available at <https://developer.nvidia.com/>.

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#### About NVIDIA

[NVIDIA](#)'s (NASDAQ: NVDA) invention of the GPU in 1999 sparked the growth of the PC gaming market, redefined modern computer graphics and revolutionized parallel computing. More recently, GPU deep learning ignited modern AI -- the next era of computing -- with the GPU acting as the brain of computers, robots and self-driving cars that can perceive and understand the world. Today, NVIDIA is increasingly known as "the AI computing company." More information at <http://nvidianews.nvidia.com/>.

(1) Figure averages the percentage increase of benchmark numbers in the following: GeForce GTX 1080 at 3840x2160 with launch driver 368.81 vs 378.74 on an Intel Core i7 5930K, 16GB DDR4 using Win10 x64. *Ashes of the Singularity*, Crazy Preset (46.5, 50.9 or 9%), *Tom Clancy's The Division* 1.6, Max Settings + 1x SMAA Ultra (31.5, 32.7 or 4%) *Hitman*, High Settings + High SSAO (50.6, 62.1 or 23%), *Rise of the Tomb Raider*, Very High + 2x SSAA (20.5, 27.2 or 33%), and *Gears of War 4*, Ultra Preset (41.2, 45.2 or 10%).

Certain statements in this press release including, but not limited to, statements as to: Certain statements in this press release including, but not limited to, statements as to: the impact and benefits of the GameWorks DX12 resources and updates, NVIDIA Aftermath, Nsight Visual Studio Edition, PIX Plug-in and Game Ready Driver are forward-looking statements that are subject to risks and uncertainties that could cause results to be materially different than expectations. Important factors that could cause actual results to differ materially include: global economic conditions; our reliance on third parties to manufacture, assemble, package and test our products; the impact of technological development and competition; development of new products and technologies or enhancements to our existing product and technologies; market acceptance of our products or our partners' products; design, manufacturing or software defects; changes in consumer preferences or demands; changes in industry standards and interfaces; unexpected loss of performance of our products or technologies when integrated into systems; as well as other factors detailed from time to time in the reports NVIDIA files with the Securities and Exchange Commission, or SEC, including its Form 10-Q for the fiscal period ended October 30, 2016. Copies of reports filed with the SEC are posted on the company's website and are available from NVIDIA without charge. These forward-looking statements are not guarantees of future performance and speak only as of the date hereof, and, except as required by law, NVIDIA disclaims any obligation to update these forward-looking statements to reflect future events or circumstances.

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