Intel® Graphics Performance Analyzers (Intel® GPA) 2017 R4 Release Notes

By Seth S. (Intel), published on December 21, 2017

Thank you for choosing the Intel® Graphics Performance Analyzers (Intel® GPA), available as a standalone product and as part of Intel® System Studio.

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Introduction

Intel® GPA provides tools for graphics analysis and optimizations for making games and other graphicsintensive applications run even faster. The tools support the platforms based on the latest generations of Intel® Core™ and Intel Atom™ processor families, for applications developed for Windows*, Android*, Ubuntu*, or macOS*.

Intel® GPA provides a common and integrated user interface for collecting performance data. Using it, you can quickly see performance opportunities in your application, saving time and getting products to market faster.

For detailed information and assistance in using the product, refer to the following online resources:

- Home Page - view detailed information about the tool, including links to training and support resources, as well as videos on the product to help you get started quickly.

- Getting Started - get the main features overview and learn how to start using the tools on different host systems.

- Training and Documentation - learn at your level with Getting Started guides, videos and tutorials.

Online Help for Windows* Host - get details on how to analyze Windows* and Android* applications from a Windows* system.

- Online Help for macOS* Host - get details on how to analyze Android* or macOS* applications from a macOS* system.

- Online Help for Ubuntu* Host - get details on how to analyze Android* or Ubuntu* applications from an Ubuntu* system.

- Support Forum - report issues and get help with using Intel® GPA.

What's New

Intel® GPA 2017 R4 offers the following new features:

New Features for Analyzing All Graphics APIs

New Platforms

- Support for Intel UHD Graphics 630 Series (8th Generation Intel Core Processor Family)
- Support for Windows* 10 Fall Creators Update ("Redstone 3")

Graphics Frame Analyzer for DirectX12, DirectX11 (new UI), and OpenGL

- Auto DPI scaling with support for multiple monitors
- Full-frame metrics table is available in Metrics Viewer
- Message pane to notify the user of Intel GPA related feature information and tool alerts
- New buffer viewer that provides a flexible way of setting up data representation
- Tooltips to help users quickly learn the new Intel GPA interface

Graphics Trace Analyzer

- Auto DPI scaling with support for multiple monitors

New Features for Analyzing Microsoft DirectX* Applications

System Analyzer

- Increased accuracy of per-application GPU Busy metrics

Graphics Frame Analyzer

- Profile Windows Mixed Reality applications on the Windows Fall Creators update

- New User Interface for DirectX 11 frames with additional features [Beta]:
  - ° Improved error handling for experiments
  - ° Support for UAV textures and buffers
  - ° Non-zero texture array layers are shown
  - ° GenerateMips, ResolveSubresource, ClearView, and all Copy calls are considered events (graphics-intensive calls) and are shown on the Bar Chart

- Hotspot Analysis mode available for DirectX 12 and DirectX 11 (new UI) frames. Users can now easily find the most problematic events in a frame by bottleneck.

- Resource Viewer Pane has been redesigned and now supports all widely-used types of D3D resources and views. Only supported in DirectX 12 and DirectX 11 (new UI) frames.

- Resource History for DirectX 12 and DirectX 11 (new UI) frames now shows all events that use a selected resource along with a type of usage (input, output, execution)

- Support for Texture 2x2 experiment for DirectX 12 frames has been improved by supporting additional texture formats including compressed and depth/stencil

New Features for Analyzing Open GL* Applications

Graphics Trace Analyzer

- Tracing for OpenGL applications on macOS and Ubuntu has been enabled in Graphics Monitor.

New Features for Analyzing macOS Metal* Applications

Multi-Frame Analyzer

- Improved HUD visualization and added a dark mode theme

- New Simple Pixel Shader Experiment

- Added the ability to skip to the entry point of a particular shader

- Export metrics from Metrics Pane and export entire API log with metrics

- Added region queries for more accurate measurements of command encoders

- An experiments Log to track applied experiments within the frame

- Improved metrics analysis tab to help users more easily identify bottlenecks within a particular event

- Several small UI improvements to provide better UX during pause mode

- Additional defects fixed to support new Metal titles

System Requirements and Supported Platforms

The minimum system requirements are:

- **Host Processor:** Intel® Core™ Processor

- **Target Processor**: See the list of supported Windows* and Android* devices below

- **System Memory:** 8GB RAM

- **Video Memory:** 512MB RAM

- **Minimum display resolution for client system:** 1280x1024

- **Disk Space:** 300MB for minimal product installation

Direct installation of Intel® GPA on 32-bit Windows* systems is not supported. However, if you need to analyze an application on a 32-bit Windows* target system, you can use the following workaround:

1. Copy the 32-bit *.msi installer distributed with the 64-bit installation from your analysis system to the target system.
2. Run the installer on the target system to install System Analyzer and Graphics Monitor.
3. Start the Graphics Monitor and the target application on the 32-bit system and connect to it from the 64-bit host system.

For details, see the Running System Analyzer on a Windows* 32-bit System article.

The table below shows platforms and applications supported by Intel® GPA 2017 R4

Target System (the system where your game runs)	Host System (your development system where you run the analysis)	Target Application (types of supported applications running on the target system)
Windows* 7 SP1/8/8.1/10	Windows* 7 SP1/8/8.1/10	Microsoft* DirectX* 9/9Ex, 10.0/10.1, 11.0/11.1/11.2/11.3
Windows* 10	Windows* 10	Microsoft* DirectX* 12, 12.1

Google* Android* 4.1, 4.2, 4.3, 4.4, 5.x, 6.0 The specific version depends on the officially-released OS for commercial version of Android* phones and tablets. See the list of supported devices below. NOTE: Graphics Frame Analyzer does not currently support GPU metrics for the Intel® processor code-named Clover Trail+.	Windows* 7 SP1/8/8.1/10 or macOS* 10.11, 10.12 or Ubuntu* 16.04	OpenGL* ES 1.0, 1.1, 2.0, 3.0, 3.1, 3.2
Ubuntu* 16.04	Ubuntu* 16.04	OpenGL* 3.2, 3.3, 4.0, 4.1 Core Profile
macOS* 10.12 and 10.13	macOS* 10.12 and 10.13	OpenGL* 3.2, 3.3, 4.0, 4.1 Core Profile and Metal* 1 and 2

Intel® GPA does not support the following Windows* configurations: All server editions, Windows* 8 RT, or Windows* 7 starter kit.

Supported Windows* Graphics Devices

Intel® GPA supports the following graphics devices as targets for analyzing Windows* workloads. All these targets have enhanced metric support:

Target	Processor
Intel® UHD Graphics 630	8th generation Intel® Core™ processor
Intel® UHD Graphics 630	7th generation Intel® Core™ processor
Intel® UHD Graphics 620	7th generation Intel® Core™ processor
Intel® HD Graphics 620	7th generation Intel® Core™ processor
Intel® HD Graphics 615	7th generation Intel® Core™ m processor
Intel® HD Graphics 530	6th generation Intel® Core™ processor
Intel® HD Graphics 515	6th generation Intel® Core™ m processor
Iris® graphics 6100	5th generation Intel® Core™ processor
Intel® HD Graphics 5500 and 6000	5th generation Intel® Core™ processor

Intel® HD Graphics 5300	5th generation Intel® Core™ m processor family
Iris® Pro graphics 5200	4th generation Intel® Core™ processor
Iris® graphics 5100	4th generation Intel® Core™ processor
Intel® HD Graphics 4200, 4400, 4600, and 5000	4th generation Intel® Core™ processor
Intel® HD Graphics 2500 and 4000	3rd generation Intel® Core™ processor
Intel® HD Graphics	Intel® Celeron® processor N3000, N3050, and N3150 Intel® Pentium® processor N3700

Although the tools may appear to work with other graphics devices, these devices are unsupported. Some features and metrics may not be available on unsupported platforms. If you run into in an issue when using the tools with any supported configuration, please report this issue through the Support Forum.

Driver Requirements for Intel® HD Graphics

When running Intel® GPA on platforms with supported Intel® HD Graphics, the tools require the latest graphics drivers for proper operation. You may download and install the latest graphics drivers from http://downloadcenter.intel.com/.

Intel® GPA inspects your current driver version and notifies you if your driver is out-of-date.

Supported Devices Based on Intel® Atom™ Processor

Intel® GPA supports the following devices based on Intel® Atom™ processor:

Processor Model	GPU	Android* Version	Supported Tools
Intel® Atom™ Z35XX	Imagination Technologies* PowerVR G6430	Android* 4.4 (KitKat), Android* 5.x (Lollipop)	System Analyzer Graphics Frame Analyzer Trace Analyzer [Beta]

Intel® Atom™ Z36XXX/Z37XXX	Intel® HD Graphics	Android* 4.2.2 (Jelly Bean MR1) Android* 4.4 (KitKat) Android* 5.x (Lollipop)	System Analyzer Graphics Frame Analyzer Trace Analyzer [Beta]
Intel® Atom™ Z25XX	Imagination Technologies* PowerVR SGX544MP2	Android* 4.2.2 (Jelly Bean MR1) Android* 4.4 (KitKat)	System Analyzer Graphics Frame Analyzer Trace Analyzer [Beta]
Intel® Atom™ x7-Z8700, x5-Z8500, and x5-Z8300	Intel® HD Graphics	Android* 5.x (Lollipop), Android* 6.0 (Marshmallow)	System Analyzer Graphics Frame Analyzer Trace Analyzer [Beta]

Supported ARM*–Based Devices

The following devices are supported with Intel® GPA:

Model	GPU	Android* Version
Samsung* Galaxy S5	Qualcomm* Adreno 330	Android* 5.0
Samsung* Galaxy Nexus (GT-i9500)	Imagination Technologies* PowerVR SGX544	Android* 4.4
Samsung* Galaxy S4 Mini (GT-I9190)	Qualcomm* Adreno 305	Android* 4.4
Samsung* Galaxy S III (GT-i9300)	ARM* Mali 400MP	Android* 4.3
Google* Nexus 5	Qualcomm* Adreno 330	Android* 5.1
Nvidia* Shield tablet	NVIDIA* Tegra* K1 processor	Android* 5.1

Your system configuration should satisfy the following requirements:

- Your ARM*-based device is running Android* 4.1, 4.2, 4.3, 4.4, 5.0, 5.1, or
6.0
- Your Android* application uses OpenGL* ES 1.0, 1.1, 2.0, 3.0, 3.1, or 3.2
- Regardless of your ARM* system type, your application must be 32-bit

For support level details for ARM*-based devices, see this article.

Installation Notes

Installing Intel® GPA

Download the Intel® GPA installer from the Intel® GPA Home Page.

Installing Intel® GPA on Windows* Target and Host Systems

To install the tools on Windows*, download the *.msi package from the Intel® GPA Home Page and run the installer file.

The following prerequisites should be installed before you run the installer:

- Microsoft DirectX* Runtime June 2010

- Microsoft .NET 4.0 (via redirection to an external web site for download and installation)

If you use the product in a host/target configuration, install Intel® GPA on both systems. For more information on the host/target configuration, refer to Best Practices.

For details on how to set up an Android* device for analysis with Intel® GPA, see Configuring Target and Analysis Systems.

Installing Intel® GPA on Ubuntu* Host System

To install Intel® GPA on Ubuntu*, download the .tar package, extract the files, and run the .deb installer.

It is not necessary to explicitly install Intel® GPA on the Android* target device since the tools automatically install the necessary files on the target device when you run System Analyzer. For details on how to set up an Android* device for analysis with Intel® GPA, see Configuring Target and Analysis Systems.

Installing Intel® GPA on macOS* Host System

To install the tools on macOS*, download the .zip package, unzip the files, and run the .pkg installer.

It is not necessary to explicitly install Intel® GPA on the Android* target device because the tools automatically install the necessary files on the target device when you run the System Analyzer. For details on how to set up an Android* device for analysis with Intel® GPA, see Configuring Target and Analysis Systems.

Technical Support and Troubleshooting

For technical support, including answers to questions not addressed in the installed product, visit the Support Forum.

Troubleshooting Android* Connection Problems

If the target device does not appear when the `adb devices` command is executed on the client system, do the following:

1. Disconnect the device
2. Execute `$ adb kill-server`
3. Reconnect the device
4. Run `$ adb devices`

If these steps do not work, try restarting the system and running `$adb devices` again. Consult product documentation for your device to see if a custom USB driver needs to be installed.

Known Issues and Limitations

General

- Your system must be connected to the internet while you are installing Intel® GPA.

- Selecting all ergs might cause a significant memory usage in Graphics Frame Analyzer.

- Intel® GPA uses sophisticated techniques for analyzing graphics performance which may conflict with third-party performance analyzers. Therefore, ensure that other performance analyzers are disabled prior to running any of these tools. For third-party graphics, consult the vendor's website.

- Intel® GPA does not support use of Remote Desktop Connection.

- Graphics Frame Analyzer (DirectX* 9,10,11) runs best on systems with a minimum of 4GB of physical memory. Additionally, consider running the Graphics Frame Analyzer (DirectX* 9,10,11) in a networked configuration (the server is your target graphics device, and the client running the Graphics Frame Analyzer is a 64-bit OS with at least 8GB of memory).

- On 64-bit operating systems with less than 8GB of memory, warning messages, parse errors, very long load times, or other issues may occur when loading a large or complex frame capture file.

Analyzing Android* Workloads

- Graphics Frame Analyzer does not currently support viewing every available OpenGL/OpenGL ES* texture format.

- Intel® GPA provides limited support for analyzing browser workloads on Android*. You can view metrics in the System Analyzer, but the tools do not support creating or viewing frame capture files or trace capture files for browser workloads. Attempting to create or view these files may result in incorrect results or program crashes.

- Intel® GPA may fail to analyze OpenGL* multi-context games.

Analyzing Windows* Workloads

- The Texture 2x2 experiment might work incorrectly for some DirectX* 12 workloads.

- Intel® GPA may show offsets used in DirectX* 12 API call parameters in scientific format.

- Render Target visualization experiments "Highlight" and "Hide" are applied to all Draw calls in a frame. As a result, some objects may disappear and/or be highlighted incorrectly.

- Frame Analyzer may crash if the ScissorRect experiment is deselected. The application will go back to Frame File open view.

- Downgrade from 17.2 to 17.1 might not be successful.

- The Overdraw experiment for Render Targets with 16-bit and 32-bit Alpha channel is not supported now.

- To view Render Targets with 16-bit and 32-bit Alpha channel, you should disable Alpha channel in the Render Targets viewer.

- To ensure accurate measurements on platforms based on Intel® HD Graphics, profile your application in the full-screen mode. If windowed mode is required, make sure only your application is running. Intel® GPA does not support profiling multiple applications simultaneously.

- For best results when analyzing frame or trace capture files on the same system where you run your game, follow these steps:
  - Run your game and capture a frame or trace file.
  - Shut down your game and other non-essential applications.
  - Launch the Intel® GPA.

- To run Intel® GPA on hybrid graphics solutions (a combination of Intel® Processor Graphics and third-party discrete graphics), you must first disable one of the graphics solutions.

- Secure Boot, also known as Trusted Boot, is a security feature in Windows* 8 enabled in BIOS settings which can cause unpredictable behavior when the **"Auto-detect launched applications"** option is enabled in Graphics Monitor Preferences. Disable Secure Boot in the BIOS to use the auto-detection feature for analyzing application performance with Intel® GPA. The current version of the tools can now detect Secure Boot, and warns you of this situation.

- To view the full metric set with the tools for Intel® Processor Graphics on systems with one or more third-party graphics device(s) and platforms based on Intel® HD Graphics, ensure that Intel is the preferred graphics processor. You can set this in the Control Panel application for the thirdparty hardware. Applications running under Graphics Monitor and a third-party device show GPU metrics on DirectX* 9 as initialized to 0 and on DirectX* 10/11 as unavailable.

- When using the Intel® GPA, disable the screen saver and power management features on the

  target system running the Graphics Monitor — the Screen Saver interferes with the quality of the metrics data being collected. In addition, if the target system is locked (which may happen when a Screen Saver starts), the connection from the host system to the target system will be terminated.

- Intel® GPA does not support frame capture or analysis for:
  - applications that execute on the Debug D3D runtime system
  - applications that use the Reference D3D Device

- System Analyzer HUD may not operate properly when applications use copy-protection, antidebugging mechanisms, or non-standard encrypted launching schemes.

- Intel® GPA provides analysis functionality by inserting itself between your application and Microsoft DirectX*. Therefore, the tools may not work correctly with certain applications which themselves hook or intercept DirectX* APIs or interfaces.

- Intel® GPA does not support Universal Windows Platform applications where the graphics API uses compositing techniques such as HTML5 or XAML interop. Only traditional DirectX* rendering is supported. To workaround this limitation, port your application as a Desktop application, and then use the full Intel® GPA suite of tools.

- In some cases, the Overview tab in Graphics Frame Analyzer (DirectX* 9,10,11) can present GPU Duration values higher than Frame Duration values measured during game run time. This could be a result of Graphics Frame Analyzer (DirectX* 9,10,11) playing the captured frame back in offscreen mode which can be slower than on-screen rendering done in the game.
To make playback run on-screen use this registry setting on the target system:
HKEY_CURRENT_USER\Software\Intel\GPA\16.4\ForceOnScreenPlaybackForRemoteFA = 1
and connect to the target with Graphics Frame Analyzer (DirectX* 9,10,11) running on a separate host. If these requirements are met, the playback runs in off-screen mode on the

target. If the frame was captured from the full-screen game, but playback renders it in a windowed mode, then try pressing Alt+Enter on the target to switch playback to full-screen mode.

- Frame capture using Graphics Monitor runs best on 64-bit operating systems with a minimum of 4GB of physical memory.
  On 32-bit operating systems (or 64-bit operating systems with <4GB of memory), out of memory or capture failed messages can occur.

- Scenes that re-create resource views during multi-threaded rendering have limited support in the current Intel® GPA version, and might have issues with frame replays in Graphics Frame Analyzer.

*Other names and brands may be claimed as the property of others.

** Disclaimer: Intel disclaims all liability regarding rooting of devices. Users should consult the applicable laws and regulations and proceed with caution. Rooting may or may not void any warranty applicable to your devices.

For more complete information about compiler optimizations, see our Optimization Notice.