

MARUI-PlugIn Performance Guide

Tips and Tricks for getting the best performance when using Maya in VR

v 1.4

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This guide is intended for users of MARUI-PlugIn v3 (“Limitless”) who are experiencing performance issues when using Autodesk Maya in VR such as low frame rate, studdering, lag, or slow response times. It includes practical steps that can be applied immediately, references to further information online, and guides to getting individual support with your performance related issues.

When using MARUI, you can receive a simple objective performance measure in the form of the current in-VR frame rate by running the following MEL command:

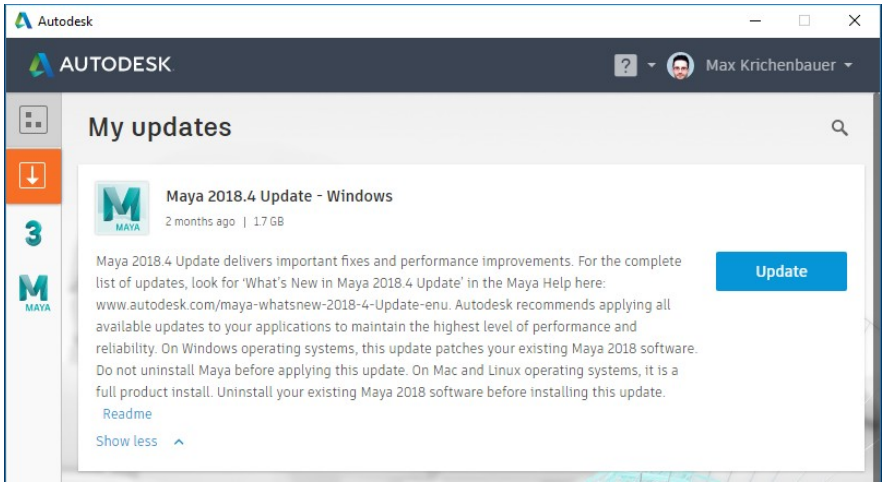
```
MARUI_Set -reportFramerate true;
```

Step 1: Check for common performance pitfalls

The following are a collection of common sources of performance problems when using MARUI and their solutions. These work mostly independently and are easy to adopt.

1.1: Update to the latest version of Maya, MARUI, and your graphics card drivers

MARUI is relying on Maya’s functionality, so all patches and performance improvements to Maya will also positively affect MARUI’s performance. Use the ***Autodesk Desktop App*** to make sure that your version of Maya is up-to-date.

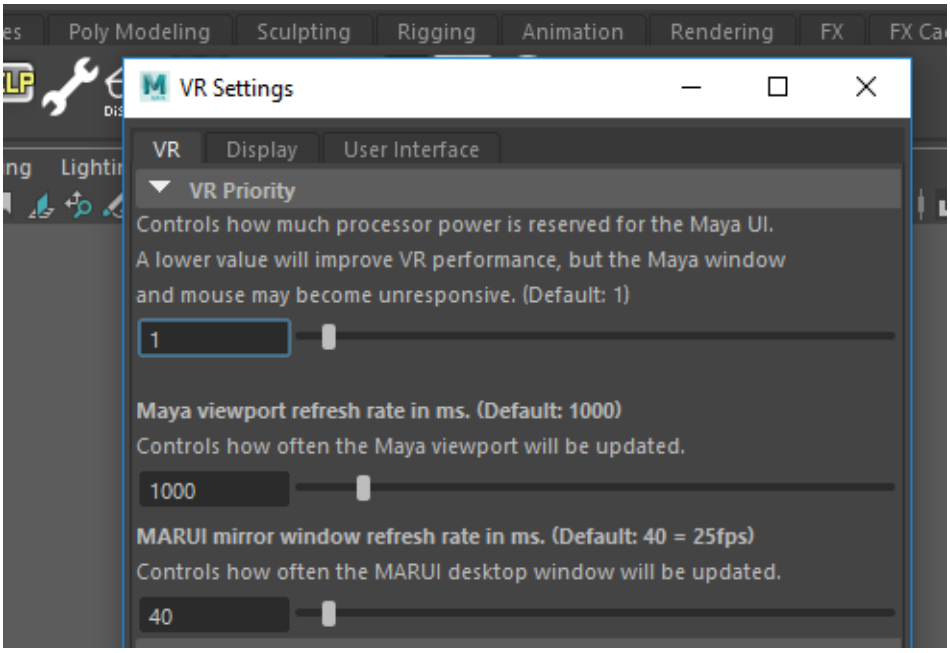


Likewise, we are constantly trying to improve MARUI’s performance. Please check if you are using the latest version, and if possible, update your version of MARUI. You can always download the latest version of MARUI at https://www.marui-plugin.com/download/

Finally, if you can please consider updating your graphics card drivers, as new drivers often bring display performance enhancements.

1.2: MARUI Performance Settings

In the MARUI Settings (the wrench icon in the MARUI shelf tab) "***VR***" tab, the first two items "***VR Priority***" and "***Maya viewport refresh rate***" greatly affect the display performance in VR.



"***VR Priority***" controls how much of your computers resources are reserved to Maya's normal window user interface (ie. the non-VR desktop Maya user interface). A lower value will result in better VR performance. If you do not intend to use the Maya window while running MARUI, ***reduce*** this value.

Warning: Setting this value to zero may improve your performance, but may also lead to cases where your Maya window becomes unresponsive, so use this optimization with care.

"***Maya viewport refresh rate***" similarly controls how often the Maya window's 3D viewports are updated while MARUI is running. MARUI prevents Maya's viewports from being updated in order to allocate more resources to VR performance. If you do not intend to use the Maya viewports while MARUI is running, ***increase*** this value as much as possible.

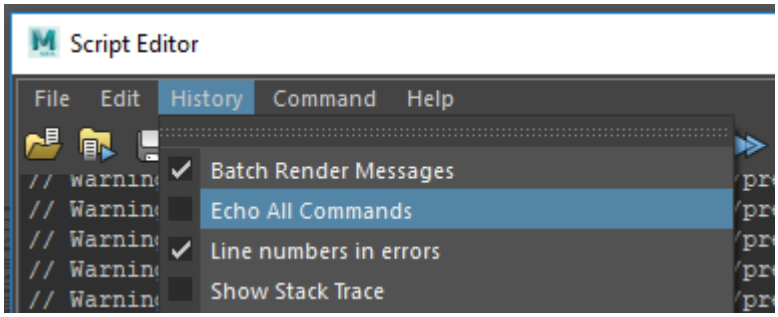
"***MARUI mirror window refresh rate***" this controls how often the MARUI window that is displayed in Maya and shows the VR view is updated. Unless you have observers who want to see the in-VR field of view of the VR user (for example in the case of collaboration or review settings), then ***increase*** this value to improve system performance.

1.3: Switch the Maya Viewport display engine to DirectX

Maya can operate using either OpenGL or DirectX as rendering engine. OpenGL is the default, but for VR purposes DirectX usually has better performance. You can change the Maya display engine in the Maya Preferences which you can access from the title menu "*Windows*" → "*Settings/Preferences*" → "*Preferences*". The rendering engine can be changed in the "***Display***" category, under "***Viewport 2.0***".

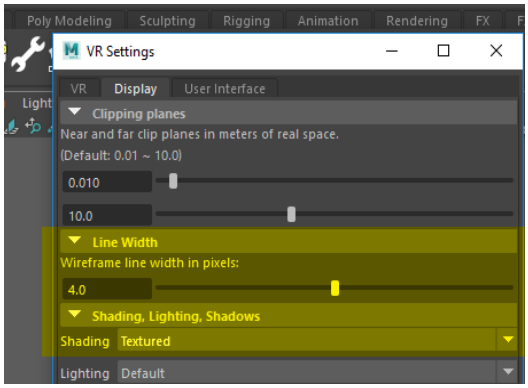
1.4: Disable “Echo All Commands” in the script editor

In the Maya Script Editor’s “***History***” menu, ensure that “***Echo All Commands***” is ***disabled***.

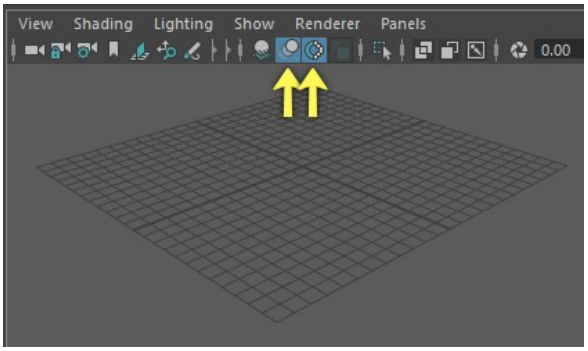


1.5: Edge width and wireframe display

Maya rendering requires more performance to render edges than it does to render solid objects. If you can, switch from “Wireframe” or “Wireframe on Shaded” display modes in MARUI to “Solid” or “Textured”. If you cannot do without wireframe rendering, reduce the line width in the MARUI settings “Display” tab as much as possible.



1.6: Disable Viewport2.0 Motion Blur and Multisample anti-aliasing



Maya’s Viewport 2.0 has a Motion Blur and a Multisample anti feature, which can greatly affect the display performance, especially when playing back animation. Setting these in the normal Maya viewport also affects VR rendering. Since the VR display refresh rate and resolution are different from the Maya viewport, the effect of these settings is usually not perceivable in VR, but they can affect the performance nonetheless.

1.7: Reload the scene after hiding objects

If you can hide parts of your scene to improve display performance, there are cases where this does not have an immediate result. If possible, try to save your scene and re-start Maya and re-loading your scene to give Maya a fresh start at optimizing scene display.

1.8: Don't use Smooth Display for Animation

If you use Maya's "Display Smoothness" (Hotkey "3") on a skinned and animated mesh, Maya needs to reevaluate display smoothness at every frame, causing huge performance costs.

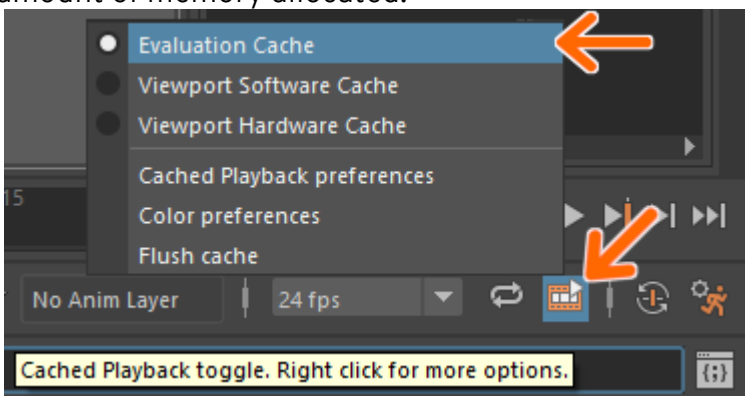
If possible, disable Display Smoothness during animation playback.

1.9: Use GPU Caches

Using GPU caches in your scene can greatly increase your VR performance, especially in animation playback. To use GPU caches you must load the GPU cache plug-in (included in Maya). Open the Plug-in Manager ("Windows" → "Settings/Preferences" → "Plug-in Manager") and click the "loaded" checkbox next to "gpuCache.mll". Now you can create / import GPU caches from the "Cache" menu in the title bar menu. Select "Cache" → "GPU Cache" → "Export All" (or "Export Selected" if you only want to use GPU caches for some objects in your scene such as an animated character). You can then hide the objects in your scene (or mute the animation for selected animated characters) and import the GPU cache from the file that you created in the export step. Please note that sometimes, re-loading a scene after hiding objects brings an additional performance boost (see 1.7).

1.10: Enable Animation Playback Evaluation Caches

When animation playback is slow or leads to lagging or jittering, enable Maya's "Cached Playback" feature and set the preferred mode to "Evaluation Cache". To further increase the time range covered by the cache, open the Cached Playback Preferences and increase the amount of memory allocated.



1.11: Throttling the scene interaction rate

MARUI automatically delays your editing interactions to improve the display frame rate. That means that when you drag with your controller to move an object in your Maya scene, MARUI may detect that this is slowing down Maya so much that the frame rate in your VR headset drops below an acceptable rate. In these cases, MARUI will start to apply your controller interactions to the Maya scene at a later time, for example with a 0.5 second delay in order to ensure that the VR display stays above the acceptable minimum frame rate. This may appear as a "lag" or "delay" in interaction.

You can enable or disable this feature in the MARUI settings dialog in the "User Interface" tab,

1.12: Disable Asynchronous Spacewarp / Reprojection / Motion Smoothing

Many VR headsets attempt to improve the impression by warping the image shown in the headset to match your motion. Often, this is experienced as distortions or "wobble" around controllers or as a distorted view of the Maya scene.

You can disable this feature for your respective VR device:

For the Oculus Rift, open the Oculus Debug Tool (usually at C:\Program Files\Oculus\Support\oculus-diagnostics\OculusDebugTool.exe) and set "Asynchronous Spacewarp" to "Disabled".

For the HTC Vive and WindowsMR headsets, open SteamVR, open the Settings dialog, and in the "Developer" Category, disable "Reprojection" and "Motion Smoothing".

Step 2: Optimize your scene for parallel evaluation performance

Maya tries to use all your computers CPUs and CPU cores as well as your GPU to parallelize and speed up scene evaluation. However, some scene elements and rigging methods accidentally disable these performance improvement attempts, effectively reducing your computer to a singe core machine. These can include seemingly innocuous techniques like using the scripting commands “getAttr”/”setAttr” in expressions. Often, updating your scene to use different equivalent techniques can greatly improve performance, especially during animation playback.

For a complete documentation on utilizing parallel evaluation performance enhancements, see Autodesks original guide “***Using Parallel Maya***”:

Maya 2019:
http://download.autodesk.com/us/company/files/2019/UsingParallelMaya.pdf

Maya 2018:
http://download.autodesk.com/us/company/files/2018/UsingParallelMaya.pdf

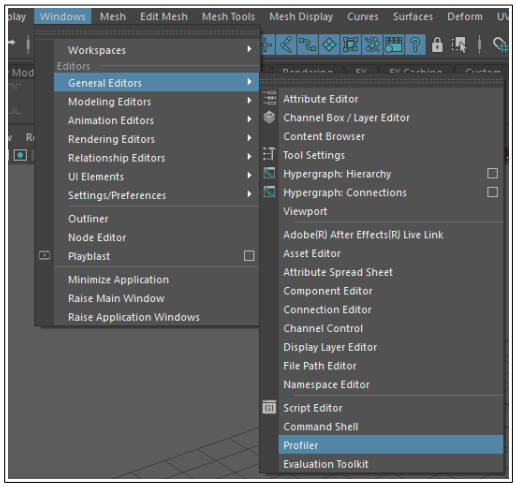
Maya 2017:
http://download.autodesk.com/us/company/files/2017/UsingParallelMaya.pdf

Maya 2016:
http://download.autodesk.com/us/company/files/2016/UsingParallelMaya.pdf

Step3: Send us a performance profiling sample

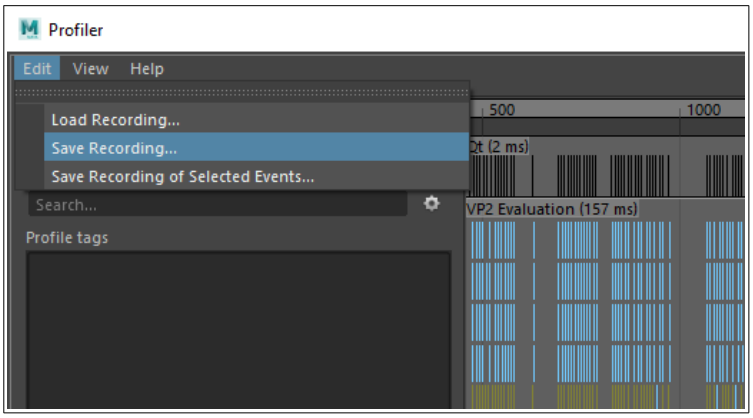
If the previous steps did not sufficiently improve performance, we offer our users an in-depth analysis and support in making MARUI run more smoothly in the future based on Maya Profiler data.

Open the Maya Profiler window from the Maya title Menu "*Windows*" → "*General Editors*" → "*Profiler*":



While MARUI is running, press the "***Start Recording***" button in the top-left corner of the Profiler. Wait for a few seconds to allow the Profiler to collect a sufficient amount of data, then press the button again to "***Stop Recording***". The recorded data will be displayed on the right side of the Profiler.

To save the data to a file, select "***Edit***" → "***Save Recording...***" from the Profiler's title menu, and send us the file to support@marui-plugin.com



This data consists of evaluation time statistics and does not include any detail information about your scene other than names of nodes evaluated. Still, we will treat all data confidential and will not disclose any information to a third party.