NVIDIA®
mental ray®

mental ray for Maya 1.2

Release Notes
mental ray for Maya 2016, 2017, and 2018, mental ray 3.14.5.1

MRFM 1.2 adds Maya 2018 support and NVIDIA Volta GPU support, significantly improves GI Next rendering performance for complex scenes, and resolves a great number of issues.

Starting with this version, mental ray GPU acceleration requires CUDA 9 capable driver (on Volta, and on earlier Pascal, Maxwell, Kepler GPUs). NVIDIA Fermi GPU (sm 2.x) support is discontinued.

Known issues:

Connecting or disconnecting satellites in Resource Manage shelf is not possible during active mental ray Viewport or IPR rendering. Temporary switching Viewport rendered to VP2 and/or closing IPR provides an easy workaround.

For shaders using user framebuffers for value accumulation (like reading and adding values), artifacts like high intensity / burned out pixels are possible if GI Next indirect illumination is used.

Flexera has reported possible vulnerability of lmadmin license server in versions prior to 11.14.1.1. When license server security is a concern, we recommend to install newer version of the license server than the one distributed with mental ray for Maya 1.2 installers. Below are download links for lmadmin version 11.14.1.2.

Windows:
https://s3.amazonaws.com/arcdownload/mentalray/licensing/lmadmin-i86_n3-11_14_1_2.exe

Mac OSX:
https://s3.amazonaws.com/arcdownload/mentalray/licensing/lmadmin-universal_mac10-11_14_1_2.zip

Linux:
https://s3.amazonaws.com/arcdownload/mentalray/licensing/lmadmin-i86_lsb-11_14_1_2.bin

Plugin Enhancements and Changes

Added support for Maya 2018.

Fixed possible crashes when switching from mental ray Viewport to Viewport 2.0 and modifying camera or scene after that.

Fixed possible missing color transform when exporting to .mi file or when rendering with satellite hosts. Note: in some corner cases, color profile for the camera may still be missing.

Invalid file paths in mentalrayTexture nodes can now be re-pathed using the File Path Editor.

Fixed possible SynColor color management issue, in particular when using mental ray for Maya plugin with Maya 2017 Update 4.

On Mac OSX and Linux platforms, fixed possible issues with user-local paths MDL materials.

When rendering on a machine without CUDA-capable GPU, GI Next indirect illumination falls back to CPU. Erroneously, if rendering was done with satellites which had CUDA-capable GPUs, GPU acceleration on satellite was disabled as well. This is fixed now.

resources.py script is renamed to mr_resources.py, in order to avoid conflict with other Maya packages.

For Maya 2017 Update 4, fixed default port used for satellites in mental ray shelf's Resource Management dialog.

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For GI Next indirect illumination, added support for NVIDIA Volta GPUs. GPU acceleration plugins are built with CUDA 9 compiler now, which implies the requirement on a CUDA 9-capable GPU driver, and discontinues support for NVIDIA Fermi (sm 2.x) GPUs.

GI Next indirect illumination rendering performance has been significantly improved, in particular for scenes with uneven complexity distribution.

On Linux platform, mental ray would detect professional NVIDIA GPUs even without recent GPU driver installed. For qualified GPUs, this allows usage of professional GPU licenses without driver update, though GPU acceleration itself would not be available.

For Material Definition Language (MDL), compiler plugins has been updated with numerous bug fixes and improvements.

Release notes for Version 1.1.

Plugin Enhancements and Changes

Plugin UI

Added missing rendering restart for groups or instances created with mental ray Viewport, or when moving groups containing the camera.

Set the enable/disable button in the Toolkit when starting the Viewport renderer cannot be started because another rendering is currently running.

Avoid unnecessary Viewport rendering restarts when editing materials in Hypershade.

Fixed possible freeze when switching between Viewport and RenderCurrentFrame.

Fixed possible crash for scenes with camera inside of a group, when hiding was applied to the camera or to the group.

Miscellaneous

Fixed possible missing displacement. In MRFM 1.1, default texture filtering mode was switched to ray differential based elliptic filtering. As ray differentials are not available for displacement shaders, filtering during displacement is reverted to the old behavior.

Fixed Xgen export to .mi archives (exported archives were empty / 0 bytes).

Improved handling of missing license errors. Fix possible freeze/endless error loop when batch rendering fails due to missing license.

Fixed a crash after unloading mental ray plugin.

Fixed possible wrong render layers in batch rendering.

For batch rendering, request license only once instead of doing so per pass.

Fixed possible slow plugin load if workspace directory contains extensive number of files. MDL shaders are only looked up in the **mdl** subdir now.

Fixed possible parser errors in **.mi** shader declarations, such as Bifrost.

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Fixed possible extensive delays on connecting to misspelled / unreachable satellite hosts.

For rendering with MDL materials, fixed possible null tag fatal when using texture name in let statement. Fixed wrong issued warning if a module imports another module from the same archive.

For satellite rendering of scenes with MDL materials, fixed possible unknown texture fatal crash when MDL materials on satellites are installed on different paths than on the main/master machine. In particular, this is the case for **vMaterials**, which are installed on a per-user basis.

Release notes for Version 1.1.

Known limitations:

mental ray for Maya 1.0 / 1.0.1 satellites are not network-compatible with this release and need to be updated.

Attaching MILA material after unloaded mental ray for Maya (MRFM) plugin may crash Maya. It is recommended two restart Maya instead of loading plugin for the second time.

Plugin UI

Added option for Render Current Frame to no longer block UI. Enabled by default, this feature can be disabled under **RenderSettings/Configuration/check Advanced Settings/Render Current Frame without Blocking Maya UI**.

Added GGX glossy model to MILA layering shaders.

For MILA layering UI: added history/undo functionality; prevent user from creating invalid connections. Empty or unsupported layer or mix components no longer cause errors or incorrect display in the MILA material UI.

Material Viewer renders MDL materials correctly now.

For light baking, number of CPU threads used is no longer fixed to 8, but is set to be the number of threads used for frame rendering.

Miscellaneous

On Mac OSX platform, fixed failure to render Xgen scenes (in earlier versions, this could be work-arounded by starting Maya on a command line).

Ray-differential-based MIPMAP pyramid texture filtering is a default now.

Improved interoperability with MDL plugin.

For scenes imported from older plugin versions, fixed possible inconsistencies in rendering options for progressive and final frame rendering. In particular, for some scenes GI Next indirect illumination was disabled for Render Frame, but enabled in the Viewport. The **miUnifiedSampling** attribute is deprecated, and its functionality is merged with (previously partially redundant) **miRenderUsing** attribute.

Improved scene translation performance.

Fixed unneeded export of MDL materials from previously rendered scenes into new scenes.

Fixed crash in translator for scenes with motion blur and grouped camera (exact hierarchy mode).

Fixed possible mental ray fatal crash when switching between Viewport and IPR or disabling Viewport after creating nParticles.

Mental ray satellites are changed to start with **-texture_continue on** option. This way, missing local texture files issue errors but no longer trigger fatal issues requiring Maya restart.

On Mac OSX platform, fixed failure to start imf_disp tool. Added imf_disp.app to the distribution.

On Mac OSX, lmadmin license server included into the package is updated to version 11.14.1.0.

Added missing SDK header files to devkit.

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For GI Next indirect illumination rendering (GI Next):

- Added support for light baking.
- Added effective support for (multiple) instancing, with no performance penalties for scenes with large number of unshared instances.
- Improved dynamic memory utilization for GPUs with low amount of memory.
- Improved rendering performance.
- In multihosted rendering precomputation of satellites is slow, so all the precomputation work is now done on the main host.
- Fixed possible crash when rendering scenes with (semi-)transparent MDL materials.

For MILA layering shaders, added GGX glossy model support.

Fixed possible crash when rendering scenes with MILA layering materials with glossy refractions.

For tile-based progressive rendering, dynamic tile sizing is not applied if region/windows is specified (earlier version applied it only if the full camera resolution was rendered).

For progressive rendering, fixed filtering of user framebuffers.

Improved ray tracing acceleration performance for motion blur scenes with nested assemblies.

For MILA layering shader and for MDL shaders, added shading normal clamping to improving quality and fixing possible shading artifacts for scenes with strong bump mapping and/or poor quality tessellation. For some scene, this change also has a positive performance impact.

For MDL compiler, added support for MDL archives and improved handling of uniform parameters.

For MDL shaders, fixed failure to import IES light profile is the .ies file extension was capitalized.

For unified sampling used with "contrast all buffers" string option, fixed possible insufficient number of samples taken and/or dependency of the termination criteria on the order of framebuffers.

For satellite rendering, fixed possible failure to establish connection over IPv6 and improved error message reporting.

Installer

Windows installer now offers custom component selection and custom installation paths. Known limitation of the installer framework: for a custom location to be available for selection, it needs to be created before starting the installer.

Windows and Mac OSX installers now use mental ray core version for the product version.

Windows installer lists both mental ray for Maya (MRFM) version and mental ray core version.

For mental ray standalone, Windows uninstaller cleans the bin subdirectory completely, even when additional DLLs were collected there.

On Mac OSX, changes installer file extension from .dmg to .pkg.

On Linux, allow installation of satellites targeting different Maya version on the same machine.

Release notes for Version 1.0.

Plugin UI

New mental ray shelf providing mental ray shortcuts and Web links.

For legacy finalgather rendering, fixed failure to select and keep finalgather mode (Render Settings --> Quality Tab -> Legacy -> Final Gathering -> Final Gathering Tracing).

Improved readability of rendering logs: added new lines and messages at the end of any rendered frame.

Interactive Viewport

Resolved several issues of missing or wrong lighting from object lights.

Miscellaneous

For Maya 2017, added partial compatibility with Maya 2017 "Gold" version (before Maya 2017 Update 1 release). Note that during rendering of scenes with color management, an error on loading syncolorproxy shader may appear for the first rendering. This error can be ignored: mental ray gracefully tries to find an older Autodesk SynColor library in that case.

For Maya 2017, fixed Render.exe invocation errors. XML renderer description file was missing in the plugin installation.

When rendering with satellites, added error reporting and a window pop-up on licensing failures.

Fixed a crash when attempting to use light baking in combination with GI Next indirect illumination. This combination is currently not supported.

For Japanese version, fixed script errors.

Fixed a crash when unloading and re-loading the mental ray plugin.

On Windows, debug asserts were left over in the release build of the plugin and several shader packages. This is fixed now.

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For GI Next indirect illumination rendering (GI Next):

- improved rendering of large scenes on machines with multiple heterogeneous GPUs. If memory is sufficient on some of GPUs, only those are used for rendering. In older mental ray versions, GPU with lowest amount of memory might have triggered CPU rendering fallback, even if scene would fit into the largest memory GPU.
- fixed possible crash for aborting rendering.
- introduced an experimental string option ("gi presample refine lighting") that allows to specify an optional multiplying factor of the light sampling quality for a post-process

> refining step of GI Next pre-sampling, which can help in reducing flickering in animation for scenes with complex lighting.
>
> - experimental: added support for efficient geometry (multi) **instancing.** In this version, efficient shared instancing support needs to be enabled by setting **"gi flatten instances"** string option to **0**.

For motion blur scenes rendered with BSP2 acceleration, improved quality of the intersection acceleration structures. For some scenes, this leads to dramatic rendering time improvement.

On Windows platform, added support for fully-scaled parallel rendering on machines with more than 64 CPUs.

If installed, NVIDIA Professional Application Center (PAC) is now automatically started with mental ray.

Fixed possible poor texture caching performance due to too low amount of memory used (misinterpretation of memory limits).

For tile-based progressive rendering, fixed issue with window (region) rendering. In that case, adaptive tile window size is disabled now.

Fixed possible artifacts for interactive rendering of scenes with high number of MDL materials. Caching of on-demand MIPMAP pyramids for image files was broken, and sometimes pyramids for wrong image files were used.

For Alembic geometry shader, fixed a crash if the shader was invoked for parallel execution from multiple threads for HDF5 .abc files. This is possible for scenes with assemblies.

On Windows platforms, fixed wrong error message text on shader and plugin linkage failures.

On Windows platforms, suppress possible pop-up error windows. In particular, this fixes possible freezes of Maya when using misconfigured satellites running on Windows.

Release notes for Version 1.0.

Miscellaneous

Fixed light linkage in combination with Exact Hierarchy mode.

Fixed processing of scenes with "inheritsTransform" flag set to false in Exact Hierarchy translation mode.

Fixed support of quality error cutoff specified as a color value.

Respect user-specified aspect ratio in rendering other than Viewport.

Fixed possible errors in plugin .mi shader declaration file parser.

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For GI Next indirect illumination rendering, fixed several issues leading to artifacts and animation flickering. Added a temporary workaround for large scenes exceeding approximately 206 Mio triangles. Added alpha channel to the indirect illumination values. Fixed background rendering with Maya shade packages.

Installer and package distribution

Professional Application Center version 3.0 application is added to the distribution. This application simplifies license and update management.

Documentation for mental ray plugin and for license tools has been added. On Windows platform, Start menu items pointing to this documentation is added.

Flexera lmadmin server and nvidia vendor file are added to the distribution. If floating licenses are used, lmadmin license server and vendor file may need to be installed according to documentation provided.

For shader developers, deprecated mayaapi.h and adsk*.h header files are restored.

Known Issues and Limitations

Installation:

For Beta program participants, if is recommended to uninstall MDL Material Exchange. If not done, MDL Material Exchange package update installer may fail, causing mental ray plugin and standalone installer failure.

For Beta program participants, it is recommended to remove Maya preferences files. In particular, for Maya 2017, xgenMR.py plugin has been merged into mental ray for Maya plugin. Old preferences may cause xgenMR.py load error messages.

Parts of HTML documentation (plugin, licensing) uses JavaScript may not work with Web browsers default security settings, including Google Chrome's. Users need to familiarize themselves with potential security risks arising from relaxing security settings, and avoid browsing pages other than mental ray documentation with the same browser. In particular, for Google Chrome, settings are applies for all Chrome windows, i.e. Chrome should not be used accessing potentially unsafe Web sites while security settings are relaxed form default. PDF documentations can be used as a safe alternative.

On Mac OSX platform, Flexera lmadmin installer may not function properly. If that's the case, it is recommended to proceed as follows:

- On the command line, unpack the archive with unzip command.
- Change to an inner app directory content:
  cd FlexNet_Publisher_License_Server_*.app/Contents/MacOS
- Run the installer executable:
  ./FlexNet_Publisher_License_Server_*
  and go through the UI installation instructions.

Plugin: Viewport rendering:

Playblast is not yet supported.

Motion blur is not yet supported.

Time slider updates only work in Viewport Rendering when the option 'Support time slider changes' is enabled.

Saving file may cause Viewport Render to start in standard perspective camera.

On Mac OSX platform, a dirty screen is shown shortly when the Viewport is started for the first time mental ray is used as Viewport renderer, once per Maya session.

Changing frame number does not update animation in Viewport or IPR render of MASH_FUI demo file.

Hiding and un-hiding might sometimes require restarting the Viewport render.

Renaming/duplicating objects not picked up in Viewport Render/IPR session.

Maya refuses to accept satellites while rendering with mental ray, for example if the mental ray Viewport is active.

Disabling Viewport Render when running playback in a scene that contains a particle emitter may cause Maya crash.

Applying fog to spotlight while IPR or mental ray Viewport is running may cause Maya crash.

Plugin: other known issues:

Maya Software Spot Volume Doesn't Render.

Animated Object Light Turns off after First Frame.

A camera created using Create Camera shows No Camera Animation Motion Blur.

When using Render Sequence, the HUD at the bottom of the Render View window stays stuck reporting the wrong frame number and it doesn't update.

The mental ray contour rendering is not supported in the Viewport/IPR with progressive or unified sampling. If detected, fall back into classic tile-based rendering is used.

mental ray:

For GI Next indirect illumination rendering:

- Specular caustics may be noisy and slow to converge. Caustic photon maps can be used to improve performance and quality.
- Geometry instancing/sharing is not supported in the current version yet. Due to the scene geometry replication, his may cause a fallback into CPU rendering, resp. fallback into CPU rendering with the mental ray core acceleration data structure (see mental ray 3.14.3.25 release notes).
- mental ray particle objects are not supported.
- Volumetric effects on indirect illumination are not supported.
- Performance of MILA subsurface scattering shader may be inferior vs. rendering with final gather.

Release notes for Beta releases

mental ray for Maya – PreRelease

Plugin Enhancements and Changes

Interactive Viewport

Fixed missing rendering update on MDL material node changes.

Fixed possible missing default light.

Fixed endless loop when running mental ray Viewport rendering while the Material Viewer is open.

Miscellaneous

Fixed possible crash on Linux platform in case of plugin autoload (STL symbols resolved into shader dynamic libraries).

Fixed Export Selection.

Shader changes

Fixed default parameter values for mental ray physical materials.

mental ray

Bug fixes

Fixed possible differences in between progressive and tile based rendering with half-float framebuffers. Color clipping was mistakenly applied in progressive rendering case.

For GI Next indirect illumination rendering:

- Improved presampling algorithm in order to resolve possible artifacts in complex lighting and animation rendering. With the new algorithm, presampling may take moderately longer time and produce moderately larger shading map.
- Fixed possible low quality / artifacts for scenes containing geometry with reflection flag set off.
- Added a temporary workaround for large scenes above 206 Mio. triangles. Temporarily, large scenes are rendered with mental ray core acceleration structures instead of GI Next plugin ones. Small visual difference in rendering may be expected. For consistency, temporary string option **"gi triangle limit"** **N** is added. The number, in millions, specifies the scene complexity to switch to

mental ray core acceleration. This allows predictable and consistent shot / animation rendering, where scene complexity may vary from frame to frame.

Fixed search paths for Material Definition Language shaders in mental ray standalone.

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Plugin Enhancements and Changes

Interactive Viewport

Fixed a crash when click-dragging in the Viewport.

Improve update speed when moving/rotating objects in the Viewport.

Fixed missing hide/un-hide updates in the Viewport rendering. So far, only objects were updated that were visible when the Viewport rendering started.

Fixed missing image plane update when moving with the camera in the Viewport.

Fixed a fatal error after rendering the default nParticles emitter.

Don't render the default light when object lights are in the scene.

Added support for the DirectX mode.

Fixed the "Selected Objects Only" mode.

Miscellaneous

Fixed redundant XgenMR.py plugin in Maya 2016 and 2016.5.

Fixed the port number for satellites on Maya 2016 Extension 1.

mip_binaryproxy shader is again visible in Maya.

Shader changes

Updated the SynColor library reference for Maya 2017 Update 1 release.

Fix handling of legacy mental ray materials, like dielectric_material. Some legacy materials default parameter values were corrupted when loaded with MRFM plugin Beta 8 or later.

Fixed a crash with useribl shader in interactive sessions when using a non-existent texture.

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Feature Improvements

Added proper detection of MDL emissive materials (to properly support them as lights).

Bug fixes

Fixed a regression of motion blur making GI Next fall back to CPU.

Fixed artifacts in hair rendering due to wrong clipping of ray directions.

Fixed a crash when moving physical area lights in the Viewport.

Fixed a crash when hiding and un-hiding objects in the Viewport and IPR.

Fixed occasional changes in the intensity of GI when moving objects or lights in the Viewport and IPR.

Fixed a fatal when editing camera settings with motion blur with IPR.

Fixed GI Next unstable intensities between frames in animation (bug in GI Next lookups).

Fixed spurious tile artifacts with GI Next.

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Plugin Enhancements and Changes

Interactive Viewport

Fixed exporting of .mi files when Viewport is active (viewport rendering is stopped in that case).

Fixed several issues in Viewport activation/deactivation in miscellaneous workflows and contexts.

Fixed possible missing parameter connections when rendering in Viewport or IPR.

For Blending mode, renamed "Blending Steps" to "Blending Steps per Second", and added annotations.

For Blending mode, fixed possible delay in showing the final rendered image. Fixed possible issue of missing blending for the first frame.

Fixed missing updates for interactive MDL material parameters changes.

Render Resource Manager Dialog

The new tab, "Satellite", is added to Render Resource Manger dialog. It allows to specify hosts/ports to be used as satellite rendering, and activate/deactivate them for rendering. The default port is 14160, 14165, and 14170 for Maya 2016, 2016.5, and 2017 respectively. Maya would keep hosts/ports in preferences for a restart, but not the activations marks. Satellite thus need to need to be re-activated once Maya is started again.

Note that in this version of mental ray standalone nodes used in satellite mode participate in tile rendering, but not in the progressive rendering.

mental ray standalone are not a part of mental ray for Maya plugin package. A separate mental ray standalone installer may be provided to Beta testers at a later point.

Miscellaneous

Fixed Alembic GPU cache support in exact hierarchy export mode.

Fixed missing look development kit shaders (declaration file was missing in the distributed package).

Renamed mental ray Dock to "mentalray Toolkit".

GI Display button for display results during the precomputation stage is removed. For the majority of scenes, the overhead for additional computations caused initial subframe display to be barely faster than with precomputation display disabled.

Fixed possible issues in setting number of rendering threads to automatic values.

Installer

On Windows, fixed possible installer failure if C:\Program Files\Common Files\Autodesk Shared\Modules\Maya\<MayaVersion> directory is missing.

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Feature Improvements

Improved performance of GI Next indirect illumination rendering.

For Material Definition Language (MDL), added support for measured BSDFs. Changed the default for number of glossy rays used from 4 to 1.

Bug fixes

For Material Definition Language (MDL), fixed possible jiggled shadow terminator artifacts, possible missing emission from some of MDL emissive materials, possible fatal in interactive rendering, and possible wrong handling of textures in absolute paths, as well as possible crash for complex materials.

GI Next indirect illumination rendering, fixed possible illumination difference/artifacts for scenes with some object visibility flag combinations.

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Plugin Enhancements and Changes

Interactive Viewport

Fixed several issues in ExportExactHierarchy. For Viewport and IPR rendering, this mode is enforced since Beta8 in order to provide updates of moved geometry groups and similar scene changes.

Fixed possible camera misalignment between viewport and final frame rendering.

Fixed automatic detection of number of threads used for interactive rendering (Viewport or IPR).

Render Resource Manager Dialog

Implemented new render resource dialog (under Render Settings / Preferences / Render Resources / Open Render Resource Manager). This dialog allows to specify number of threads used for interactive, final frame, and batch renderer, select GPUs to be used for GPU-accelerated rendering.

Miscellaneous

For Maya 2017, fixed missing mentalrayTexture mode.

Fixed difference between progressive and final frame Sun & Sky rendering.

Added "Reload MDL" button for reloading/refreshing Material Definition Language (MDL) materials (under Rendering Setting / Scene / Materials / MDL, with Show Advancing Settings enabled).

Added "Meters per Scene Units" option under Render Settings / Scene / Materials / MDL. Wired to mental ray's new "mdl meters per scene unit" string option, it allows to specify length units. Wrong length scale has caused artifacts in some scene.

Completed conversion of string options to attributes, which improves event handling in interactive rendering.

Fixed script errors for cases when mental ray viewport rendering is unavailable, such as using Maya with DirectX.

Shader changes

MayaShaders and mayabase shader packages are changed to remove direct dependency on Autodesk's SynColor library. A new (pseudo)-shader package syncolorproxy is added. For scenes without color management, SynColor library is no longer required and is not loaded by mental ray. For scenes with Autodesk's color management, mental ray would load syncolorproxy automatically (on demand). In case Autodesk's SynColor library cannot be found, corresponding error is printed. In mental ray standalone, rendering would continue without color profiles applied.

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Feature Improvements

Added support for Material Definition Language (MDL) version 1.3.

On Linux and Mac OSX platforms, RUNPATHs/loaded paths are used to assure Optix Prime library is found without need to specify LD_LIBRARY_PATH/DYLD_LIBRARY_PATH environment variable.

Bug fixes

Fixed missing lighting update when moving a group containing light(s).

Fixed possible color clipping artifacts in progressive rendering done with fixed point (8 or 16 bit) framebuffers.

Fixed possible artifacts in scenes with volumetric rendering. Volume was not set correctly if shadow shaders were returning false, which in particular was the case for some Bifrost scenes.

Recently added mi_ray_differential_transform function was not exported in the Plugin's symbol table.

For MILA layering shaders, fixed possible artifacts on thin-walled materials, and scenes with photons/caustics.

For MDL materials, fixed black rendering artifacts if zero-value volume absorption coefficient was specified.

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Plugin Enhancements and Changes

Interactive Viewport

Viewport blending to hardware rendering allows not to specify time interval. On scene changes which have blending enabled, viewport would switch to hardware rendering. *Once mental ray renders the first subframe*, viewport would start blending to (progressively improving in the meantime) mental ray rendering image over the specified time interval (**Viewport/Renderer/mental ray/Rendering/Blend from VP2 to mental ray/Blend Period**).

Viewport/Renderer/mental ray/Rendering/Blend from VP2 to mental ray/Iteration Count specifies the number of blending steps (i.e. changes in the percentage of VP2 and mental ray image weights). This parameter replaces the number of mental ray rendering subframes used for full blending in earlier plugin versions.

Viewport blending is now enabled on the camera changes, but not on other changes like material editing. This is the first step in achieving the goal of allowing precise camera and geometry manipulation, and allowing smooth material and lighting tuning.

Possible black frame with Viewport blending enabled is fixed.

Added mental ray HUD to the Viewport Window. It can be enabled/disabled under "Viewport/Renderer/mental ray/Features/Show mental ray HUD" settings. If enabled, HUD would show rendered image resolution and rendering progress. *Note that in Maya 2016, this feature may not work properly for versions older than Maya 2016 SP6.*

Added Disable mental ray / Enable mental ray button to mental ray dock.

Added a button to open Viewport Setting dialog from mental ray dock.

Fixed possible stretched image after camera aspect ratio change / window resize.

When rendering in Viewport or IPR, enforce ExportExactHierarchy export into mental ray. This fixes missing updates of moved geometry groups. For IPR, this fixes a regression from older version of mental ray plugin.

Miscellaneous

For IPR rendering, (soft) memory limit for mental ray rendering was set to 800 MB, which is not justified for modern hardware and scenes. Use maximal available memory instead.

Fixed quality settings in "Quality as color" mode.

GI Next Auto Density option is converted to an attribute.

In UI, the LPE (light path expression) string used to specify light path expression of render passes is made read-only.

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Feature Improvements

For GI Next indirect illumination rendering, improved the distribution of pre-sampling points.

For MILA layering shaders, improved performance of scenes with very high number (thousands) of lights.

Distributed package content

This Beta is distributed with the initial version of installer on Windows and Linux.

It is currently not possible to specify custom location for the plugin installation. The installer would use the standard one (**C:\Program Files\NVIDIA Corporation\mentalray for Maya <Maya Version>** on Windows).

However, the installer identifies custom location of Maya installation properly.

Note that installer registers mentalray.mod file in the Maya application directory – for all users. If a user-specific mentalray.mod file was used by an earlier Beta installation, it needs to be deleted as user .mod file takes precedence over the application one, and application would use old version of the plugin instead of Beta8.

Other changes

The expiration date for Beta 8 has been extended until September 21st, 2016.

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Plugin Enhancements and Changes

Interactive Viewport

Added an option to blend between hardware rendered image of VP2 to mental ray rendering (Viewport/Render/mental ray/"Blend from VP2 to mental ray"). If enabled, after the new image rendering is triggered, the image would fade from hardware VP2 rendering to mental ray rendering over a specified number of subframes. This allows precise scene navigation while keeping the benefits of high quality preview.

GI Next pre-sampling display is switched off by default, blending of VP2 with mental ray rendering may provide a better experience.

Fixed Maya responsiveness issues when mental ray interactive rendering is used. With "Auto Render Threads" checked, one to two CPU cores are preserved from being used by mental ray for rendering.

Added a checker box to automatically raise mental ray dock when mental ray rendering in the viewport is activated.

Fixed possible issues when opening Shader Ball rendering or IPR window while Viewport renders with mental ray.

UI Changes

Renamed Indirect Diffuse Mode from "On" to "GI Next".

Added Environment Fog to Scene tab Camera Environment section.

Miscellaneous

Continuing changes in Beta 5 and 6, more of standard string options are converted into attributes, reducing the number of rendering restart events.

The attribute **"stringOptions"** has been removed from the **"miDefaultOptions"** node. The mental ray string options which used to be listed inside the **"stringOptions"** list have been replaced by corresponding attributes. To allow users to still be able to directly override or extend mental ray string options inside Maya a new attribute **"userOptions"** has been added. It can be accessed on the **"miDefaultOptions"** node in the String Options section. Initially it is empty. Custom user scripts will need to be adapted accordingly.

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Feature Improvements

GI Next rendering has been significantly improved.

- Performance is improved significantly for scenes/GPUs with scene size + optimal work size exceeding available GPU memory.
- Hard trace depth limits are removed, depths up to 255 are supported for all ray type.
- Rendered image quality is improved by adding proximity to the tangent planes tests in the indirect illumination lookups.
- For the Maya plugin integration, GPU memory is released immediately after rendering is finished.
- Fixed possible artifact for back faced / flipped normals.

Bug fixes:

Fixed a crash when filtered texture lookup is applied to a 1 x N or N x 1 texture.

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Note:

This version adds support for mental ray GPU plugin rendering on NVIDIA Pascal generation GPUs. GPU driver update may be required, even when other GPUs are used. The minimal recommended driver versions are:

- Windows: Quadro 364.72 or Geforce 368.25,
- Linux: Quadro 367.18 (beta) / Quadro 361.45.11 or Geforce 367.18

Plugin Enhancements and Changes

Interactive Viewport

In the viewport, in addition to showing subframes, rendering progress is now displayed in a regularly interval (every second). This fixes the issue with long stalls when passing from subsampling to regular sampling.

Contour rendering is now possible in the viewport if the Progressive Mode is turned off (Render/Render Settings/Configuration/Preferences/Interactive Rendering, choose Progressive Mode "Off").

For Maya PR67, added support for RenderSequence feature (new in Maya 2017).

Added support for creating IBL environment during viewport and IPR rendering.

Continuing changes in Beta 5, more of standard string options are converted into attributes, reducing the number of rendering restart events.

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Feature Improvements

Added GI Next rendering support on NVIDIA Pascal GPUs.

Allow forward texture declarations. If an empty string is used as a texture file name in .mi texture declaration or passed as **mi_api_texture_file_def** function argument, mental ray would create a dummy 1 x 1 black texture. This texture could be incrementally changed to an actual texture file at a later point, or rendered as is. This simplifies texture-related workflows for applications integrating raylib.

Bug fixes:

For progressive interactive (viewport) rendering, fixed possible crash when adding or removing geometry objects or instances.

Fixed possible crash for scenes using segmented shadows with primitive (rectangle, disk, sphere, or cylinder) visible area lights, in particular if volume rendering is used.

For hair rendering, restrict hair length parameterization to non-negative values and ignore hair segments with negative radius. This fixes possible crashes for inaccurate hairs passed to mental ray, including some Xgen scenes.

Fixed possible crash if filtered single pixel high or wide (N x 1 or 1 x N) textures were used.

mental ray for Maya - Beta 5

Plugin Enhancements and Changes

Interactive Viewport

Most of standard string options are converted into attributes, reducing the number of rendering restart events.

Fixed missing update of IBL texture.

Stop and disable mental ray viewport rendering when starting IPR or final frame rendering.

Added close button to viewport options box.

Use percentages in viewport render resolution dropdown menu.

In order to improve interactive performance, render passes are disabled in interactive viewport and IPR rendering, where they were not accessible.

Material Preview (Shaderball Rendering)

Beta 4 fixed earlier rendering regression, but environment was still missing. Beta 5 fixes the environment rendering.

mental ray

Feature Improvements

Improved performance of GI Next pre-sampling phase if light importance sampling is used.

For shader declarations, added support for "autovolume" and "photon autovolume" requirements. The .mi declarations for Bifrost shaders now use it to ensure that "autovolume" is enabled.

Bug fixes:

For progressive interactive (viewport) rendering, fixed a crash when hiding/un-hiding object area lights.

For GI Next indirect illumination rendering:

- Fixed missing environment, hair and visible lights in GI Next pre-sampling stage display (`"gi display"` string option).
- Fixed possible crash when switching between interactive viewport and IPR / final frame modes.
- Fixed possible crash in light and material changes.

- Reduced possible rendered image mismatch with and without built-in IBL enabled, if environment shader used in the scene behaves differently for different ray types.

Fixed database tag pin-counting issues.

Distributed package content

The Maya module file for the plugin `mentalray.mod` is now part of the package. The first line in this file needs to be edited to point to the actual location where the package has been unpacked. Then, this file needs to be copied to the user's Maya module directory, on Windows: `C:\Users\%USER%\Documents\maya\[2016|2016.5|2017]\modules\`.

Upon next start of Maya, the beta plugin should appear in Maya's Plugin Manager window and can be (auto)loaded there.

The `devkit` directory has been added. In provides mental ray 3.14 shader header files, source code for mental ray base, physics, contour, and alembic shaders, as well as the `shader.c` file.

Note, that the recommended way of building C/C++ shaders on the Windows platforms is by adding `shader.c` to the project and compiling them with plain-C flag. This avoids potential compiler version and options conflicts with the previously shipped `shader.lib` binary. For existing workflows, `shader.lib` is still provided with the `devkit`.

The draft mental ray 3.14 documentation has been added.

mental ray for Maya - Beta 4

Plugin Enhancements and Changes

Interactive Viewport

Camera changes are now rendered continuously while mouse move, not only on mouse up.

Time slider changes are now respected and updated in the viewport.

New mental ray dock window,
with buttons to restore frame viewport, select a region, and pause/continue rendering.

Added faster initial GI Next display,
enabled by default in the viewport, and a check box to disable it. Enabling is recommended for interactive sessions, as it provides faster initial feedback at the expense of slightly increased total rendering time.

Overall performance is improved for progressive display.

Fixed crashes
when changing shader parameters and assigning materials, and other related issues.

Material Preview (Shaderball Rendering)

Fixed a regression.

Xgen Hair

Memory consumption is noticeably decreased.
Attributes that are not used by standard shaders will no longer be exported by default. However, they still can be selected for shaders that expect these attributes.

mental ray

Feature Improvements

Added a string option `"gi display"`, and command line option `-gi_display`, default value `off`. If enabled, a sparsely rendered image is displayed during GI Next pre-sampling phase, reducing time to wait for the initial image. This mode is recommended for interactive workflows. Some computational efforts are spent on the initial image rendering and do not contribute to final image, thus it is recommended to disable this mode for batch rendering.

Bug fixes:

For progressive interactive (viewport) rendering

- Fixed possible crashes when changing shaders or shader parameters or assigning materials during interactive sessions.
- Fixed possible null tag access fatal in interactive scene DAG changes.
- Fixed possible NaN values due to precision issues in pixel error estimates.

For GI Next indirect illumination rendering:

- fixed possible crashes when resizing camera windows, selecting rendering regions, and switching between interactive viewport and IPR modes.
- fixed possible fatal error if MDL materials were used.

In multi-hosted rendering, fixed usage of GPUs on slave machines (regression).

Fixed database tag pin-counting issues.

mental ray for Maya - Beta 3

Plugin Enhancements and Changes

On the Windows platform, all shader packages, including the `mayabase` and related shaders that implement Maya effects for mental ray, are now built by NVIDIA. Please report any incompatibilities or potential regressions.

Interactive Viewport

The mental ray rendering in Maya's Viewport 2.0 has been improved in all aspects: performance, responsiveness, and quality. The progressive interactive communication protocol is now used by default instead of the tile-based transport, allowing much faster image updates in full resolution. Other improvements in mental ray core are exploited as well.

mental ray

Feature Improvements

For progressive interactive rendering

- improved raster sampling filtering responsibility and performance.
- improved GI Next responsiveness.

For Light Importance Sampling (LIS),
improved rendering quality and reduces noise for spot lights, including rectangle and disc area lights.

For TIFF images, print image filename for warning and error messages originated from Tiff library.

Bug fixes:

For progressive interactive rendering

- fixed possible patter artifacts when rendering is stopped for a scene update.
- fixed possible tile artifacts in the beginning of rendering.
- improved raster filter performance for initial sub-frames.

Fixed possible crash with using GI Next indirect illumination in combination with progressive rendering and DISP protocol.

For GI Next rendering, fixed wrong raster offset during pre-computation intermediate display phase.

Fixed possible excessive/inconsistent tessellation of static objects in scenes with camera motion if motion displace factor is enabled ("geom displace motion factor" string option).

Fixed a crash in creating subdivision mesh `ccmesh` objects with no texture spaces but with motion vectors.

Fixed possible missing shadows
for scenes using segmented shadow mode (which is now default in mental ray for Maya), and
opaque objects with shadow shaders returning "false" but not setting visibility to opaque.

For GI Next indirect illumination rendering:

- fixed a crash in scenes containing particles but no triangles.
- fixed possible dark splotches artifacts.

Shader changes:

For the `coreutil` Alembic shader `abcimport`,
add Bezier degree 1 texture surface to all NURBS input surfaces using NURBS surface parameter
range for "uv" texture, thus providing a default texture space for such objects.

For `layering` shaders (MILA) used in segmented shadow mode,
fixed possible shadow artifacts if Fresnel factor was used for layer blending.

For the `basehair` shader `mib_illum_hair_x`,
fixed missing contribution from indirect illumination if GI Next algorithm is used.

For `layering` (MILA) subsurface scattering shader:

- fixed subsurface scattering artifacts in reflections and refractions.
- fixed possible missing shadows artifacts in segmented shadow mode.

For `coreutil` shader `mib_tiled_texture` implementing UDIM textures, fixed possible artifacts: if
`uvCoord` parameter is not wired use default from the `state->tex_list[0]` to match Maya-
specific mental ray shaders like `mayabase`.

For `base` shader `mib_shadow_transparency`,
added quick code path for opaque objects in segmented shadow mode.

mental ray for Maya Beta 2

Plugin Enhancements and Bug Fixes

Render Settings / Quality Tab

Indirect Diffuse Quality

The behavior has been adjusted to address some artifacts issue. The same quality settings will look
different but should have fewer artifacts. The general quality should not need to be set as high for a
given visual judgment, though we are interested in feedback regarding this, as it can be further
adjusted. The maximum value has been raised from 10 to 20.

When Indirect Diffuse Quality is set extremely low and the mode is Finalgather or Finalgather Force, it will no longer error for rays less than 1 as it is clamped.

GI Density

A temporary control for GI sampling density is made available for continuing to test the quality-to-density factor. If Auto Density is On, it uses the quality setting to set density. If Off, a manual setting of density is available for beta testing purposes only. It does not carry over scene saves. All scenes load up with Auto Density turned on.

Auto Samples

Fixed, so that the setting carries over scene saves.

Render Settings / Scene Tab

When creating Sun&Sky, the Indirect Diffuse (GI) Mode is checked, and if it was set to Off it's set to On (GI Next). The mode will not be changed if different than Off.

Interactive Viewport

Viewport-related options moved to option menu when mental ray renderer selected (more to add). Wireframe display for active selection can now be enabled in the new option menu.
Fix for <u>Resolution gate ignored after using mental ray in viewport</u>.

General

Fixed bad quote characters in `maya.rayrc` configuration file.

mental ray

Feature Improvements

For GI Next indirect illumination rendered on GPUs, reduce GPU memory used for intermediate buffers on GPUs with low and moderate amount of memory.

The `imf_disp` image viewer is re-based on wxWidgets library version 3. On Mac OS X platform, the new `imf_disp` application is 64-bit (for earlier versions, it was 32-bit). On Windows platform, dependency on Visual Studio 2013 runtime is removed.

Bug fixes:

For GI Next indirect illumination used in interactive rendering sessions, fixed a crash when GI Next is enabled during such session.

For scenes using BSP2 accelerations, segmented shadows unbiased Russian Roulette depth cutoff introduced in version 3.14.0.2 did not optimize rendering performance. Fixed.

For GI Next indirect illumination used in interactive rendering sessions:

- Fixed possible crash in s when objects are moved.
- Fixed possible crash in modifying lights if light importance sampling (LIS) is enabled.

For interactive rendering session, fixed potential issues on scene element caches.

For iray rendering mode, fixed possible missing computation of alpha channel with MDL materials.

For Material Definition Language (MDL) compiler, fixed handling of escape character codes.

Shader changes:

For architectural material shader used as a shadow shader, fixed possible artifacts in segmented shadow mode.

For MILA layering subsurface scattering shader, fixed rendering artifacts for scenes using finalgather force mode.

For `basehair` shader `mib_illum_hair_x`, fixed glints rendering.

For `coreutil` shaders, updated Ptex library to version 2.1.10.

On Windows platform, removed `coreutil` shader library's dependency on Visual Studio 2013 runtime.