Release Notes

Here are the current release notes for the most recent major release of *3Delight*. This is followed by all previous release notes since version 2.0 released in May 2002. For the details of what is coming in the next version, refer to the Changelog.

3Delight Studio Pro 12.5

July 2017

Features

- Introducing a new path-tracer with the *Open Shading Language* at its core. The new algorithm is both faster and simpler than the previous ray-tracer.
- Introducing a new scene description API. This allows for a more efficient scene representation and a *live render* architecture designed from the grounds up.
- The package now includes 3Delight for Katana beta.
- Deep EXR file output is faster and produces much smaller output.
- Adding "thin film" rendering capability to the renderer, enabling computation of subtle interference effects on materials with a very thin film on them.

Performance & Quality

- Greatly improved the area light sampler. The algorithm has unique performance traits which makes it suitable to render scenes with vast numbers of area lights. New algorithm also supports particles as area lights.
- Improved texture filtering performance and quality. Texture filtering operations are now x2 to x3 times faster and provide better quality render, especially for bump maps and displacement maps.
- OpenVDB matching has been accelerated substantially.
- Improved HDR sampling which leads to less noise for some maps.

3Delight Display

- Added a *Render Region* tool to select an area of interest to re-render.
- Added a Toolbar to the application. It contains the most common tools needed for an application frame buffer. Drag & Drop the tools into to get them in and out of the tool bar.
- Improved performance of the *Contact Sheet* UI.
- Introducing graphical live statistics with each rendered frame.
- Adding OCIO support.
- Improved memory management. The application should use half as much memory than before.
- Added Drag & Drop support from the thumbnail and to the application. Also supports Copy & Paste to and from the application.
- Made zooming actions smooth.

3Delight Studio Pro 12

June 2015

Features

- Introducing Multi-Light rendering. Any given display channel can now output illumination from a particular light or a set of lights.
- Introducing physically-based BSDFs : "hair", "ggx" and "gtr". These BRDFs allows modelling of realistic materials such as long hair, glass and metals.
- Improved scene editing API (IPR) : editing is much more responsive and edit commands can be sent to render in a different process.
- Displacement shaders can now be run on vertices. This is a faster alternative to the high quality fine displacement.

Performance & Quality

- Ray-traced subsurfaces quality has been greatly improved: it is less noisy and quality issues with very thin materials have been solved. Importantly, the algorithm has a much lower memory footprint (it is now independent on the total samples used for quality control).
- All around improvements of ray-tracing displaced geometry. This shows as much lower memory usage, faster render times and less cracking.
- Rendering of the Depth of field has been improved (better sampling)
- Sampling of environment maps has been improved.
- Improved ray-tracing of scenes using instanced geometry (10%).
- On Windows platform, *3Delight* plays much nicer with other software, it doesn't take all the CPU.
- Improved quality and performance of texture calls. A texture call can now return the alpha channel along with the color, this avoid duplicated lookups.
- Improved progressive rendering: renders converge much faster to the final image. Many features that were not working in progressive mode previously are working now, including: multi-camera renders, AOVs.
- Much improved ray-traced subsurface scattering algorithm. This means less noise and less samples required to render high quality subsurface lighting.

i-Display

i-Display has been ported to Qt.This improves overall stability and cross-platform compatibility. The user interface have been improved in many regards:

- Rendering progress indicators now show bucket's progress. "Post" and "Pre" indicators for incoming buckets help better tracking the overall progress of the image.
- Re-designed *Preferences* dialog for better overall presentation and functionality.
- Drag & drop and copy & paste features for better integration with other software (such as *Mail*, *PhotoShop*, *Preview*, etc ...)
- *Light Mixer* tool for real-time mixing of *Multi-Light* output.
- Complete menu and items for all `i-display` features.
- Many UI enhancement for an overall better "look and fell".

Free License

The free license can now take full advantage of a eight core computer (previously it was limited to quad-core).

3Delight Studio Pro 11

October 2013

Features

- Relighting: *3Delight* is now able to continuously rendering scenes while accepting updates. For *Maya* users, this means IPR support and for *Softimage* users it means real-time render view updates.
- Introducing multiple-importance sampling to the trace() shadeop. This allows easy development of physically-plausible materials.
- New subsurface algorithms improves performance (up to 10x faster in global illumination contexts) and renders crisper images.
- Out-of-the-box support for MARI textures (UDIMs).
- Statistics in the multi-threading case are as precise as in the single-threaded case.
- Added support for deep EXR (EXR 2.0).

Performance & Quality

- Ray-tracing performance has been improved to such a degree that we now recommend using the ray-tracing hider as the default renderer for scenes with highly complex geometry (instead of REYES). Users can expect gains up to 20x faster when using multi-bounce global illumination and glossy reflections.
- Ray-tracing of motion-blur, even in the most extreme cases, is not a problem anymore. Performance is such that there are no objectionable speed differences between motion-blurred and static frames.
- Ray-tracing of dense and translucent surfaces, such as hair, is up to 3x faster.
- Ray-tracer startup time has been accelerated. Space partition build has been multi-threaded and other, geometry specific optimizations, have been implemented.
- Sampling in the ray tracing algorithm has been greatly improved. This means that less samples are needed to obtain noise-free images, especially with image based lighting.
- Subsurface scattering is 5x faster when combined with the path tracer.
- Multi-threading scalability have been improved for both the REYES rendering algorithm as well as in the path tracer.
- Better multi-threading of texture reads. This can drastically improve render times when using a very large number of texture files. We measured improvements of up to 25% faster.
- Rendering dense volume clouds (region with many interior shaders) is up to 2.5x faster.
- Point-cloud writing is now multi-threaded.
- Shader compiler produces better code and is able to use up to 50% less varying variables as before. This translate to faster renders.
- Access to very large files have been improved by using memory mapped I/O when possible. This is especially useful when accessing large point-based files.
- Memory usage for very large polygonal meshes has been reduced. We measured up to 4x less memory used on some typical production scenes.
- tdlmake is 2x faster.

i-display

i-display has been improved to provide users with a more complete image viewing software. In this release, it provides the following improvements:

    a. Thumbnails view.
    b. Sequence management (deleting and moving images).
    c. AOV viewing.
    d. Image bookmarking.
    e. Overhaul of the menu items and shortcuts to make *i-display* more consistent and easier to use and learn.

RenderMan Interface

- Implemented the Rtx Plug-in interface. Meaning that users can provide reading functionality for their own texture formats.
- Curves now accept `'vertex'` width parameters (and not only `'varying'` as before).

Free License Upgraded to quad-core

The free license can now take full advantage of a quad-core computer (previously it was limited to dual-core). In addition, users of the free license will now have access to the more frequent updates we offer to paid customers. This will enable to follow more closely all the improvements added to *3Delight Studio Pro.*

Documentation

Online documentation has been improved and is now available through a new Wiki. (Although the main 3Delight User Manual remains available only as a PDF document.)

3Delight Studio Pro 10

August 2011

Licensing

- From this release onwards, 3Delight Studio Pro will give users access to the entire 3Delight suit of products. This includes, 3Delight command-lines tools and libraries as well as Maya and Softimage plug-ins.

Performance

- The shading interpreter (the "virtual machine" which is responsible of shader evaluation) is now using proprietary just-in-time compilation technology which translates *RenderMan RSL 2.0* shaders into SSE2 machine code. This makes the shader interpretation up to three times faster and gives a 30% speed improvement on a typical beauty render.
- Ray-tracing of occlusion and transmission rays has been greatly improved. Speedups can go anywhere between 10% and 300%.
- Ray-tracing of displacements has been optimized, speedups of up to 300% are expected.
- Added automatic ray thresholding for improved performance on highly reflective/refractive surfaces (for example, glass).
- Improved performance of area lights when using the 'illuminance' sampling mode. Acceleration can reach an order of magnitude with high sample counts and deep ray levels.

Features

- A new point-based global illumination algorithm gives very high quality results and supports transparency, a first for this class of algorithms.
- Added support for Ptextures.
- Added support for multi-channel EXRs. Writing such files doesn't require the installation of additional libraries anymore.
- Per-frame shading for multi-segment motion-blur can greatly improve performance.
- Point-cloud baking process produces a more even distribution of points and the IO (reading and writing PTC files) has been multi-threaded.
- Point-based occlusion() and indirectdiffuse() can receive a list of input files. An example usage is to separate static and dynamic elements for a more efficient baking process.
- Introducing dynamic output variables (using the new outputchannel() shadeop). This unique feature enables shader writers to create output variables on-the-fly inside shaders, lights and co-shaders. Along with the previously available "display subsets", this feature adds unparalleled flexibility to layer-oriented rendering.
- Added ability to use OpenEXR image files directly as textures. Additionally, arbitrary "tags" can be passed to the OpenEXR display driver.
- The ray-trace hider can now render in progressive mode. This makes it more suitable for faster lighting work.
- Multi-camera rendering can now shade grids once per camera to correctly render view-dependent illumination such as reflections and specular highlights. This feature, unique to 3Delight, can be enabled on a per-primitive basis using an attribute.
- The renderer accepts a list of cameras to act as "dicing cameras". For some particular geometry, *3Delight* will use the most suitable camera to perform the dicing. This feature can be used to properly bake geometry in preparation for a fly-through (by providing a number of dicing cameras along the fly-through path).
- The subsurface scattering algorithm has been considerably improved: varying absorption and scattering properties are now accepted, artifacts resulting from low point density are fixed and memory usage has been cut by half. Additionally, the pre-processing phase has been multi-threaded for a reduced "time to first pixel".
- Ray-tracer's building phase has been multi-threaded. Furthermore, the ray-tracer now supports features that were only available in REYES such as AOVs and matte objects.
- Photon mapping quality has been greatly improved and photon maps are now 50% smaller. The photon-casting process has been multi-threaded. Speed improvement is linear with the number of cores.
- Texture mapping blur quality (during texture() calls) has been improved.
- Additional improvements include better tessellation quality for subdivision meshes, better non-raster oriented dicing and better distributions of rays for ray-tracing functions.
- Added ability to read and write TIFF textures larger than 4GB.

Shader Compiler

- Shader compilation speed has been improved for large shaders.
- Improved RSL 2.0 support. This include better support for structures, dynamic arrays, etc... .

Pipeline & APIs

- Introducing the *3Delight Gx* API for evaluation of arbitrary geometry and attached primitive variables. This very simple API allows the user to evaluate any geometry supported by 3Delight (including subdivision surfaces). Geometry can be evaluated both during an ongoing render or separately from any rendering context. This makes *3Delight* usable as a general purpose geometry evaluation library.
- The *3Delight Sx* API (for shader evaluation) has been improved and now supports co-shaders. The API is also mutli-thread safe.

3Delight 9.0 and 3Delight for Maya 5.0

December 2009

New Unlimited-threads License

- A new unlimited-threads license is now available for both the *3Delight* standalone renderer and the *3Delight for Maya* plug-in. Clients that purchased the 8-thread license (and under yearly support) are automatically upgraded to unlimited-threads. The 8-thread license will no longer be available, but the 4-threads and 2-threads will continue to be available at a reduced pricing.

3Delight for Maya

- Introducing RIB Fragments: a user-friendly and flexible way of creating and managing RIB archives. This feature is useful to accelerate re-renders.
- The display drivers UI has been improved and simplified making it easier to manage and visualize output variables (AOVs). "Primary Displays" and "Secondary Displays" have been collapsed into the same UI.
- Major performance improvements to the 3Delight Relationship Editor which make it responsive even with very large scenes.
- Improved UI in the 3Delight Relationship Editor by using distinctive icons for different shaders and attributes.
- Added support for many useful Hypershade nodes, most importantly: misss shaders, car paint, metallic paint, glossy reflection and glossy refraction.
- Scene parsing optimizations reduce RIB output time by 20%.
- It is now possible to render Shave and a Haircut nodes without loading the 3dfmShave plug-in: 3Delight for Maya automatically uses Shave plug-in's RIB export function in that case.
- Maya sprite particles can now be rendered as "volumes" for correct shadowing.
- Maya fluids implementation enters a beta stage. All current limitations are listed in the user's manual in the Rendering Guidelines chapter.
- Added Maya 2010 support and dropped Maya 8.0 support.

3Delight Features

- Introducing multi-camera rendering. This features enables the output of many camera views from a single render. This functionality is especially useful for stereo rendering as it saves rendering time.
- Improvements to point-based occlusion quality: concave corners are rendered more accurately.
- The subsurface shadeop can proceed from a point-cloud file. This can save a potentially costly pre-processing step when rendering sequences.
- Billboard particles can now be rendered with a "thickness" for correct shadow casting.
- Network caching, a feature unique to *3Delight*, is now available on Windows systems.
- Added detailed memory statistics to *3Delight* to better track memory usage.

3Delight Performance

- Improved performance of occlusion() and indirectdiffuse() shadeops when rendering dense meshes. Speedups can reach 200%.
- Improved multi-threading performance on scenes containing procedural geometry (such as delayed read archives). Procedurals are now allowed to execute in parallel which can lead to speed improvements linear to the number of threads used.
- Accelerated point-based occlusion as it now supports the "irradiance shadingrate". Speedups with default settings are in the range of 200% to 300%.
- Improved multi-threading performance and memory consumption of subsurface scattering algorithm.
- Improved deep shadow map creation performance. On large shadow maps, performance increases linearly with the number of cores. Temporary disk space usage during DSM creation has been reduced three-folds.
- A new memory allocation scheme in the ray-tracer significantly lowers memory consumption when rendering object: only one object instance is kept in memory at any time. This feature is enabled through a special variable.
- Improved point-cloud loading time. This has a positive performance impact on effects such as point-based occlusion and color bleeding.

Shader Compiler

- RSL 2.0 improvements including resizeable arrays, better supports for shader classes and more efficient execution.

Pipeline & API

- Introducing the "VolumeTracer" API. This RSL plug-in allows user to easily write volume renderers.
- The "Sx" *3Delight* shader evaluation API is now embedded with the *3Delight* library (takes a single *3Delight* license when used).
- Added "Implicit Field" plug-in support (extension to the RiBlobby primitive).
- Display drivers can now access 3Delight's deep frame buffer which provides the list of visible surfaces for each pixel sample.
- Added new entries to the Ptc API and fixed compatibility issues.
- RiNuCurves now support vertex normals.

3Delight 8.5 and 3Delight for Maya 4.5

May 2009

3Delight for Maya

- Introducing the 3Delight Relationship Editor. This new user interface replaces the now deprecated Shader Manager and Attribs Node Manager and makes it much easier to view, assign and modify3Delight shaders and attributes, in a centralized location. The usability of shader and attribute collections is substantially improved thanks to this same feature and one can inspect, for each pass and at a glance, what attributes and shaders are in effect.
- Introducing "Pass Templates" It is now possible to save a given render pass as a template and create new passes based on existing templates.
- A new "round edge" features enables automatic edge rounding of sharp geometric features. Using this feature, one can round edges at render time (such as a table edge) instead of performing a costly modeling-time operator.
- Added a "dicing camera" attribute in the geometry attributes node (in the "Culling and Dicing" section). This features is useful to stabilize popping displacement during animation.
- Updates to HyperShade:

    - The "useBackground" node is fully supported.
    - Checker node with much better anti-aliasing.
    - 3D texture nodes now use texture reference objects if these are exported.

- Scene export has been optimized and runs twice as fast for certain scenes.
- The following MEL bindings have been added: RiBound, RiDetail, RiDetailRange, RiOrientation and RiShadingInterpolation.

3Delight Performance

- An overall speed increase of 20% is to be expected on all scenes thanks to SSE2 optimizations.
- Ray-tracing speed on displaced surfaces has been substantially improved. The increase can reach tenfold with large displacement.
- Cubic curve primitives take up to 20% less memory and can render up to 50% faster when using Ray-tracing.
- Improved performance of RIB reading on Windows to match that of other operating systems.
- Procedurals generated through RiProcRunProgram require much less peak memory, especially for very large primitives.

Improvements to multi-process rendering include:

- Multi-machine rendering is fully supported on Windows platforms.
- Baking 3D point-clouds using many machines is now possible.
- "Ri Filters" are supported in multi-host rendering.
- Improved behaviour with unresponsive or crashing rendering hosts.

Pipeline & API

- Array support has been added to the Ptc API. This also means that texture3d() and bake3d() accept array parameters.
- Helper functions have been added to the Display Driver API.

Shader Compiler

- *3Delight* now supports co-shaders (as per RSL 2.0) and completes the implementation of shader classes.

3Delight 8.0

October 2008

3Delight for Maya

- The way *3Delight* attributes are connected and interpreted has been much improved for greater flexibility and ease of use: it is now possible to connect only a small subset of attributes to any given node. This feature enables a hierarchical attribute interpretation scheme in which undefined attributes for a given object/node are looked up higher in the scene hierarchy.
- Images can now be rendered in background so artists can still use *Maya* while rendering frames.
- The Coordinate System node can now display an environment dome in Maya's view for easier image based lighting.
- Added render-time CSG support (boolean modeling operators).
- Improved HyperShade translation and support:
    - The following nodes exactly match Maya's look: cloth, ramp and contrast.
    - Added support for mia_material, mib_ambient_occlusion and particlSamplerInfo.
    - Photons can trigger HyperShade shader evaluation to get the correct surface color.
- The plug-in now honors *Maya* object visibility attributes (*Render Stats)* in case no *3Delight* visibility attributes have been defined.
- Added more control on how particles are rendered. For example, particles can now have a sub-pixel size.
- Added support for area lights.
- Advanced features include:
    - *RenderMan* shader writers gain control on how parameters are presented in the AE using a new parameter grouping functionality.
    - User definable light nodes gives the necessary flexibility to customize RenderMan commands output when issuing light sources.

3Delight Performance

- Ray-tracing performance, especially for specular rays, has been significantly improved.
- Multi-threading performance has been further improved, in both memory use and speed. 3Delight implements a true multi-threaded rendering core meaning that all threads share as much memory as possible.
- The photon casting algorithm has been multi-threaded.
- Improved performance and memory use on subdivision surfaces with many texture coordinates and vertex variables. Such geometry uses up to 5 times less memory.
- Atmosphere and interior shaders run much faster (up to an order of magnitude) and are controlled using an independent "volume shading rate".

Rendering Features

- Improved point-based occlusion and global illumination delivers higher quality results without loss of performance.
- Photon mapping quality has been improved:
    - Photons can trigger surface evaluation for both caustics and color bleeding to get correct reflectance and transmittance.
    - Caustics rendering quality has been improved.
    - It is now possible to cast photons from high dynamic range environment maps.
- Displacement shaders can run on vertices (instead of micro-polygons) for better ray-tracing efficiency. Additionally, many displacement shaders can be assigned to a specific object and be evaluated sequentially.
- Dicing cameras can be used to heal "pops" in displacements during animation.
- Specular highlights from area ligths are correctly rendered (e.g. square area lights will produce square shaped highlights).
- Improved filtering of blurred cubic environment map lookups.
- Edge detection has been further enhanced and outlines can now be composited directly over an output variable.
- Improved the accuracy of NURBS and conics.
- Implemented RiScopedCoordinateSystem.

Pipeline

- Introducing a new shader evaluation API and library: Sx. This API exposes methods to load and execute RenderMan shaders, in SIMD.

Shader Compiler

- Initital support of "Shader classes".
- Functions can have multiple exit points.

Tools

- tdlmake supports a new output file format: directory textures. A directory texture (or "dirtex" in short), is a standard directory with all mipmaps saved as TIFF files. This new texture format enables a more fine grained data transfer between the server and the network cache.
- ptcview can load and display photon map files.

3Delight 7.0

November 2007

3Delight for Maya

- The plug-in is better integrated into *Maya*. It now registers itself as a standard Maya renderer and is thus accessible through the *Render Settings*. Batch rendering and command line rendering (through the standard *Maya Render* command) is now possible.
- Improved HyperShade Translation:
    1. *3Delight for Maya* tracks HyperShade network modifications and only translates and compiles shaders which have changed.
    2. The following hypershade nodes are now supported: ocean, remapValue, lightInfo, layeredTexture and volumeLight. The Image Sequence options of the File texture node are now supported.
    3. HyperShade networks for light sources are correctly translated into their RenderMan SL equivalent.
    4. The *RenderMan Code* shader can now declare output variables and those can be output using secondary displays (advanced).
- Support for RIB archives creation and reading using a user friendly, yet flexible, interface.
- Out-of-the-box support for *Shave & a Haircut* and much improved *Maya Fur* support.
- Object Instancers are fully supported.
- Shadow Maps can be rendered using arbitrary cameras. This allows for better shadow map view framing and thus better quality.
- More output variables added to secondary displays.
- *Maya 2008* support.

Rendering Features

- New Image Based Lighting Algorithm. A more flexible and powerful approach to image based lighting is introduced.
- Point Based Occlusion and Color Bleeding.
- Brick Maps (3D Textures) for efficient and anti-aliased 3D data lookup.
- Display subsets. A unique feature that enables rendering of many layers, each with its own alpha channel and output variables, in one render pass.

3Delight Performance

- Multi-threading efficiency has been improved for scenes with high depth complexity.
- Point cloud files are not read in memory all at once any more: proper caching enables memory-efficient access to point cloud data.
- Subsurface scattering has been optimized and the pre-processing step is now run in multi-threaded mode.
- Deep Shadow Map creation is now multi-threaded.
- occlusion() and indirectdiffuse() have been accelerated through the use of adaptive sampling.

Texture Converter (tdlmake)

A new -preview option makes .tdl textures appear as TIFFs of lower resolution to software such as Maya; this enables you to use a single texture for both *Maya* previews and final renders. Additionally,tdlmake now supports the TARGA file formats.

New Tools

- ptc2brick is a tool to convert point cloud files to brick maps.
- ptcview is a tool to view point cloud files.
- ptcmerge is a tool to merge point cloud files.

Pipeline

- A new API to access point cloud files has been added.
- A C++ API for DSO plug-ins is now available.

3Delight 6.5

February 2007

3Delight for Maya

- *Maya Fur* support using efficient procedural geometry.
- Enhanced Hypershade support. Hypershade networks that contain animated attributes are now handled correctly.
- Secondary displays can now output many useful components from Hypershade materials, such as diffuse, specular, etc.
- A "rendermanCode" Hypershade node has been added. It can be used to execute RenderMan SL code in Hypershade networks.
- Support for Maya 8.5.

3Delight Performance

- Ray tracing speed is greatly improved. Some heavy scenes will render up to 50% faster.

64-bit Support

- *3Delight* now supports Windows 64-bit.
- *3Delight for Maya* now supports Maya 64-bit.

3Delight 6.0

November 2006

3Delight for Maya

- HyperShade support. 3DFM now automatically converts HyperShade networks to *RenderMan* shaders. 3DFM produces clean, human readable code and is easily extensible to support specific HyperShade nodes.
- Shader collections. A powerful feature that enables a per-pass *RenderMan* shader assignment mechanism.
- Complete geometry support. Paint effects, *Maya* hair, *Maya* subdivision surfaces and particles (including blobby particles) are now supported.
- Direct rendering to *Maya*'s render view.

RenderMan

- Output variables can now be output in "exclusive" mode: each output variable can have its own alpha, independent from all other output variables.
- RiNuCurves can be used to render curves specified as NURBS.
- RiHierarchicalSubdivisionMesh to render hierarchical subdivision surfaces.
- RiPoints can be rendered as patches or smooth blobbies.
- RiResource can be used to save and restore the graphics state in whole or in part.

Rendering Features

- Photon mapping to render caustics and to accelerate global illumination (final gathering). Photon mapping can be performed in a single pass or using a two pass approach.
- 3D data baking using bake3d() and texture3d() shadeops.
- Ray tracing hider to trace primary rays instead of using REYES.
- Multiple shadow maps can be aggregated into one single shadow map file for easier access. This can serve, for example, to store six shadow maps in one file for point light shadows.
- *3Delight* offers a powerful and flexible interface to render outlines such as those necessary for toon rendering.

Pipeline

- Ri Filters add extra flexibility to the *RenderMan* pipeline, enabling the user to modify the Ri commands stream at will.
- Conditional RIB commands contribute to create re-usable, context sensitive, archives.
- Network Cache has been extended to support network writes, drastically improving server load on large render farms.
- A filtering mechanism has been introduced to filter out specific error messages.

Shading Language

- Shaders can communicate with light sources using forward message passing.
- Variable length arrays are supported.

New Display Drivers and File Formats

- i-display framebuffer is now available for Mac OS X platforms.
- Added reading and writing capabilities for Photoshop PDF files. Outputting image channels to layers is supported.
- Added support for IFF, SGI and Softimage files.

3Delight 5.0

February 2006

3Delight for Maya

The package now comes with a *Maya* plugin (*3Delight for Maya*) that uses *3Delight* for rendering. The plugin provides a user friendly interface to many *3Delight* features and comes with a *RenderMan* MEL binding for increased flexibility. *3Delight for Maya* is developed in conjunction with soho vfx (www.sohovfx.com). It is based upon their Build A RIB File (BARF) tools developed by Berj Bannayan and used in production since 2003.

Multi-Threading and Multi-Processing

- *3Delight* can now render images using threads. This automatically speeds up renders on multi-cpu, multi-core and hyperthreaded machines.
- Multi-processing and network rendering now use a load-balancing algorithm for improved efficiency.

RenderMan

- Area lights are implemented through the RiAreaLightSource call. Area light sources can be specified using arbitrary geometry.
- Arbitrary output variable functionality has been extended for greater flexibility. See RiDisplay's documentation for details.
- The gather() shadeop can now return arbitrary variables for ray hit positions.
- RiGeometricApproximation now accepts a 'focusfactor' parameter to control the shading rate of out of focus geometry.
- Network cache functionality is available through the Rx library. This enables users to cache arbitrary network files using 3Delight's powerful caching system.
- The hider can render scenes without motion blur but with correct time derivatives. This is useful for performing motion blur as a post-processing step.

Performance

- Accelerated motion blur and depth of field sampling.
- Trim curves render faster and require less memory thanks to an improved algorithm.
- Ray tracing of complex scenes is now faster (up to 10%).
- Overall memory consumption has been reduced.
- i-display framebuffer is now faster on Windows.

Image Quality

- *3Delight* now offers an improved motion blur sampling that better mimics the shutter of a real camera. This generally produces smoother motion blur when enabled.
- A new 'extrememotiondof' hider option improves sampling in scenes combining large motion blur and out of focus regions.
- Cubic environment map lookups now support oversampling for better filtering.
- Shadow map filtering for low resolution shadow maps has been improved.

Image Based Lighting

- gather(), occlusion() and indirectdiffuse() can use arbitrary ray distributions for more realistic renderings using HDRI maps. Ray distributions are specified using en environment map and help produce images with correct shadows and lighting with respect to the environment.
- tdlmake can create cubic environment maps from lightprobes or two fisheye lens images.

Shader compiler

- Shaders can contain user defined annotations. This can be used by shader generators to embed information about parameter ranges, comments and other meta data. The SLO library has been augmented to retrieve annotations from shaders.
- shaderdl warns when mixing incompatible coordinate systems in arithmetic.
- Additional code optimization is now performed at the -O2 optimization level. Shaders need to be recompiled.

3Delight 4.5

August 2005

RenderMan

- *3Delight* now fully implements the CSG *RenderMan* capability.
- Enhanced arbitrary output variables support: each output variable can now have its own filter.
- The 'zthreshold' option, useful for shadowmaps, is now implemented.
- Improper displacement bounds are now reported as a warning.

Performance

- *3Delight*'s performance has been improved with better depth culling and more efficient handling of depth-complex scenes.
- Atmosphere shaders can be evaluated more efficiently, this leads to faster rendering of volumetric effects.
- Improved texture lookup speed and cache usage. This also has a beneficial effect on network traffic.
- Some very complex implicit surfaces (made of thousands of nodes) now render faster.
- Both scene loading and RIB output are about three times faster.
- A new display variable, '__CPUtime', can be used to identify shading bottlenecks.

Image Quality

- calculatenormal() now returns better normals and exhibits more details in finely displaced geometry.
- Smooth derivatives are implemented and contribute to better antialiasing of textures and procedural patterns.
- Improved DSM filtering, those should now be more coherent with conventional shadow maps.
- Atmosphere shaders can now work correctly with layered translucent surfaces.

Shader Baking

A new shadeop, bake(), can now be used to easily bake shader computed values into a .bake file. Additionally, tdlmake can now read .bake files and convert them into a texture.

Shader Compiler

The optimizer has been further improved to generate smaller and faster code, especially for very large or automatically generated shaders. This can significantly improve rendering times.

New Tools

- ribshrink is a tool to factor RIB archives out of a set of RIB files. The purpose of this tool is to save storage space and network traffic.
- ribdepends is a tool to list RIB dependencies such as textures, shaders and archives, it can also be used to create site independent RIB packages.

Linux builds

3Delight is now linked against glibc 2.3 so issues when linking with other applications (such as liquid) should be gone.

3Delight 4.0

February 2005

Multiprocessing

3Delight is now able to render a single image using multiple processors located on a single computer or on remote computers or a combination of both. This powerful feature makes it possible to distribute rendering of a single image on a render-farm without the need for external software.

Performance

Loading speed and memory usage for complex scenes has been further improved. Additionally, improvements to the shading system yields an overall 20% increase in rendering speed for complex scenes. This is the first step of a continuing optimization of the shading system.

Other features

- Rendering times are now reported in the statistics with detailed information for each part of the rendering process. This eases the identification of performance issues.
- Lightweight particles are now correctly shaded using surface shaders.
- Motion blur of RiAttributes is now properly handled.

Shader Compiler

The shader compiler shaderdl now supports variable size arrays. Some optimization options have been moved from O3 to O2 for better code generation. Compilation time has been improved for large shaders.

3Delight 3.0

November 2004

Ray Tracing

The ray tracer uses more accurate ray differentials (derivatives), leading to higher quality filtering. Oversampling can now be specified on a per shadeop basis to improve ray tracing quality.

Level of Detail

LOD is now supported and works for all primitives. This feature, combined with *3Delight*'s procedurals, can contribute to dramatically lower memory usage.

Particles

In addition to the 'sphere' and 'disk' rendering modes, RiPoints can now be rendered using a lightweight primitive suitable for very small particles such as dust. Particles are rendered as circles using a specialized algorithm.

Primitives

Tesselation algorithms have been improved for 'catmull-clark' subdivision surfaces, leading to better quality and performance. facevertex variable interpolation has been greatly improved. All quadrics and the torus are now native primitives, resulting in improved performance.

Subsurface Light Transport

The subsurface() shadeop has been further improved: it is faster and gives noticeably better results (even with higher shading rates).

RenderMan API and RIB files

The follwing *RenderMan* calls have been implemented: RiArchiveBegin, RiArchiveEnd, RiArchiveInstance (Inline archives) and RiClippingPlane. Additionally, *3Delight* can transparently read and write RIB streams compressed with gzip.

New Framebuffer

i-display is now the default framebuffer. The old framebuffer can still be enabled by modifying the rendermn.ini file distributed with the application. (Not available for MacOS X)

Network Caching

This feature now works on Mac OS X platforms.

Shader Compiler

Overall compiler's performance has been improved. Script named shaderdl (and shaderdl.bat on Windows) has been removed. The binary may now be invoked directly. It is now possible to compile multiple source files at once; specifying a directory will build all contained source files. Additionally, it is now possible to embed the shaders' source file inside compiled shaders, triggering automatic shader "on the fly" recompilation when binary backward compatibility is broken.

3Delight 2.1

May 2004

New Windows Installer

This should fix all reported path problems.

Motion Blur

3Delight now supports unlimited multi-segment motion blur for geometry deformation, transformation and camera movement.

Improved Image Quality

A new sampling strategy reduces noise when rendering motion-blur, indirect diffuse lighting, ambient occlusion, shadow maps and ray-traced shadows (when blurred). Environment map lookups give smoother looks than in previous releases.

Improved Visibility Culling

3Delight now discards geometry more aggressively with the "opacity threshold" attribute. This proves beneficial for scenes with a large number of layered semi-transparent surfaces (e.g. hair).

Deep Shadow Maps

New analytical filtering of shadow lookups gives beautiful, precise shadows even for very thin geometry such as hair. A new compression algorithm roughly halves DSM storage requirements.

Ray Tracing

The new gather() shadeop provides a flexible interface to hemisphere sampling. Ray-tracing performance improved significantly, especially for subdivision surfaces.

Geometry

Algorithms for dicing subdivision and implicit surfaces (blobbies) are three times faster on average. In addition, polygonal models made of triangles render better due to an improved dicing scheme.

Sub Surface Light Transport

subsurface() is now more robust, faster and uses less memory. A 'shadingrate' attribute gives more control over algorithm's performance.

Rx Library Calls

The renderer now provides DSOs with access to some useful internal SL functions such as option(), attribute(), texture() and noise().

Network Cache

In addition to its network texture caching functionality, *3Delight* now caches RIB archives stored on network drives (e.g. NFS).

Shading Compiler

Error and warning reports are less intrusive and more accurate.