

4.0.15.1

Milestone 4.0.15

Enhancements

- **Optimized polymesh storage:** There is an important reduction in polymesh memory use that is proportional to the total number of triangles generated. In addition, the memory use for the polymesh ray accel structures has been reduced by up to 2x. (#3408, #3420)
- **Faster ray accel build:** The polymesh ray accel build time has been reduced by up to 2x without hurting ray tracing intersection performance. (#3420)
- **Faster curvy curves:** Individual curve segments (as opposed to entire curves) that are sufficiently curvy should now render faster. (#3414)
- **Faster pixel filtering:** Samples on the edge of buckets which do not contribute to the image are no longer rendered, speeding up rendering with filter sizes which are not an exact odd number. (#3354)
- **Faster solid angle-based sampling:** The math for the solid angle-based sampling of quad area lights has been optimized resulting in slightly faster render times. This essentially removes any overhead of the new sampling technique which was introduced in the previous release. (#3406)
- **Improved volume sampling for quad and disk lights:** The importance sampling distribution used for rendering volumetric quad and disk lights has been improved, reducing the variance in the visibly noisy region near the light itself. (#3393, #3436)
- **New physically-based sky shader:** A new shader called `physical_sky` has been added to the core that implements a physically based sun and sky model. Basic controls for this shader are the color of the ground, the atmospheric haze, and the position of the sun in the sky. The sun's position can be configured either through the `solar_direction` vector, or a pair of azimuth and elevation coordinates with valid values in the 0-360° and 0-180° range, respectively. The amount of atmospheric haze can be controlled via the turbidity parameter, with valid values in the 1-10 range. `physical_sky` is hard-coded to be invisible to GI rays, so to use it as a light source you must attach it to a `skydome_light` with sufficient resolution to capture the small solar disk. *Note: This shader is in active development and will likely suffer compatibility-breaking changes in future versions, so please consider it as a technology preview and not a final implementation, although feedback is of course more than welcome.* (#3446)
- **Optimized compiler flags:** We now use more aggressive compiler optimization flags which result in up to 20% faster renders on Linux and 3% faster on Windows. (#3178, #3424)
- **Error on long EXR channel names:** When an AOV is output to an EXR file with a filename longer than 31 characters, the channels could get mixed up leading to a monochrome result. Arnold now errors at the start of a render if this could happen. Note that this limit will be increased to 255 chars once we upgrade to EXR2. (#3445)
- **Improved crash reporting when out of memory:** When running out of memory and crashing, the stacktrace report now provides a clear error message with how much memory we are using and how much is physically available. This should make users realize exactly what's going on. (#3444)

API additions

Incompatible changes

Bug fixes

Ticket	Summary	Component	Owner	Priority	Version	Created
#3403	Occasional crash with <code>deform_time_samples</code> covering partial shutter range	arnold	mike	major	4.0	8 weeks
#3405	bounding box of plane primitive is wrong when normal has a -1 component	arnold	thiago	major	4.0	8 weeks
#3407	incorrect ambient occlusion shading with exponential falloff	arnold	thiago	major	4.0	7 weeks
#3409	Bindings are not Python 3.x compatible	arnold	oscar	major	4.0	7 weeks
#3410	quantization of images truncates instead of rounds	arnold	thiago	major	4.0	7 weeks
#3412	Cook-Torrance MIS functions reflect more light than they receive at near 0 roughness	arnold	alan	major	4.0	7 weeks
#3413	camera exposure not working with semi-opaque regions above the background	arnold	alan	major	4.0	7 weeks
#3415	secondary specular in hair shader missing from specular AOV	arnold	marcos	major	4.0	7 weeks
#3418	rays tangent to a box should return the front facing normal	arnold	thiago	major	4.0	7 weeks
#3423	Scaling double-counted for oriented curves	arnold	mike	major	4.0	6 weeks
#3437	motion blurred <code>quad_light</code> renders incorrectly with <code>enable_fast_lights</code>	arnold	thiago	major	4.0	5 weeks
#3442	standard material edge darkening	arnold	alan	major	4.0	5 weeks
#3385	non-deterministic ordering of overlapping primitives across multiple renders	arnold	thiago	minor	4.0	2 months
#3449	shadow ray avg. and max hits stat broken	arnold	marcos	minor	4.0	4 weeks
#3443	remove unused <code>shadow_bias</code> option	arnold	marcos	trivial	4.0	5 weeks

Ticket	Summary	Keywords	Component	Owner	Priority	Milestone
#3429	mesh intersection can create bad barycentric coordinates	rgh, 4.0.15.1	arnold	ramon	major	4.0.16
#3433	Cloning a node with a linked parameter causes a crash when destroying nodes	4.0.15.1	arnold	angel	major	4.0.16
#3458	shadow ring artifact with non-black <code>shadow_color</code>	4.0.15.1	arnold	thiago	major	4.0.16
#3475	Add pixel aspect ratio to EXR images	oiio, 4.0.15.1	arnold	ramon	major	4.0.16
#3482	MIS samples identical for transparent surfaces along a ray	framestore, 4.0.15.1	arnold	ramon	major	4.0.16
#3483	distortion in skydome light's sample mapping causing severe flickering	4.0.15.1	arnold	alan	major	4.0.16