Supported Features and Known Limitations

Quick Summary

- Arnold GPU supports complex shading networks, SSS, hair, atmospherics, instancing, and procedurals.
- With the same settings, GPU renders will currently be noisier than CPU renders since GPU renders are "non-splitting" (i.e. one path per camera/AA sample). Accordingly, to achieve equivalent noise the AA sample count will need to be increased in GPU renders. Adaptive rendering is fully supported.
- *standard_surface, standard_hair,* and *standard_volume* are supported, with some limitations (see the table below).
- OSL is supported, with some limitations currently (see below).
- OpenVDB volumes are supported, with some limitations currently (see below).
- Volume displacement is supported, with some limitations currently (see below).
- Filename attribute tags are supported. Mipmap bias is not supported.
- Light linking is not supported on volumes.
- Limited AOV support.
- Trace sets are not supported.
- Custom procedurals, drivers, color managers are supported.
- Custom shaders, cameras, filters, BSDFs are not supported.
- Noice is not supported with Arnold GPU renders (because the variance filter is not supported on Arnold GPU)

OSL

Initial support for OSL has been added to the GPU renderer. As in the CPU renderer, you can mix and match OSL and Arnold shaders in the same shading network. Note that this initial support is still not complete and currently has a number of limitations as listed below.

Shading operations

Currently, there is limited support for specific shading operations, as follows:

- Dynamic string operations
- Message passing

OpenVDB

The GPU renderer supports OpenVDB and matches the CPU renderer visually quite well and is feature-complete. The match with CPU will become increasingly good as the step-size parameter is reduced.

Volume displacement

The match with CPU will become increasingly good as the step-size parameter is reduced.

Supported Features and Known Limitations

Feature	GPU Support	Notes
Cameras		
cyl_camera	Yes	
fisheye_camera	Yes	
ortho_camera	Yes	
persp_camera	Yes	
spherical_camera	Yes	
uv_camera	Yes	
vr_camera	Yes	
Color Managers		
color_manager_ocio	Yes	
color_manager_syncolor	Yes	
Drivers		
cryptomatte_manifest_driver	No	
driver_deepexr	No	
driver_exr	Yes	
driver_jpeg	Yes	

driver_png	Yes		
driver_tiff	Yes		
Filters			
blackman_harris_filter	Yes	One single filter for all AOVs.	
box_filter	Yes	One single filter for all AOVs.	
gaussian_filter	Yes	One single filter for all AOVs.	
triangle_filter	Yes	One single filter for all AOVs.	
closest_filter	Yes	One single filter for all AOVs.	
All other filters	No	Fallback to box filter. One single filter for all AOVs.	
Lights			
cylinder_light	Yes		
disk_light	Yes		
distant_light	Yes		
mesh_light	Yes		
photometric_light	Yes		
point_light	Yes		
quad_light	Yes	Light portals supported	
skydome_light	Yes		
spot_light	Yes		
Operators			
collection	Yes		
disable	Yes		
include_graph	Yes		
materialx	Yes		
merge	Yes		
set_parameter	Yes		
set_transform	Yes		
switch_operator	Yes		
options	Yes		
override	Yes		
Shaders			
abs	Yes		
add	Yes		
ambient_occlusion	Yes	Trace sets are not supported.	
aov_read_float	Yes		
aov_read_int	Yes		
aov_read_rgb	Yes		
aov_read_rgba	Yes		
aov_write_float	Yes		
aov_write_int	Yes		
aov_write_rgb	Yes		
aov_write_rgba	Yes		
atan	Yes		
atmosphere_volume	Yes		
barndoor	Yes		
blackbody	Yes		
bump2d	Yes		
bump3d	Yes		
c4d_texture_tag	Yes		
c4d_texture_tag_rgba	Yes		
cache	Yes	This is a no-op on GPU.	
camera_projection	Yes		
car_paint	Yes		
cell_noise	Yes		
checkerboard	Yes		
clamp	Yes		
clip_geo	No		
color_convert	Yes		

color_correct	Yes	
color_jitter	Yes	
compare	Yes	
complement	Yes	
complex_ior	Yes	
cross	Yes	
cryptomatte	No	
curvature	Yes	Trace sets are not supported.
divide	Yes	
dot	Yes	
exp	Yes	
facing_ratio	Yes	
flakes	Yes	
flat	Yes	
float_to_int	Yes	
float_to_matrix	No	
float_to_rgb	Yes	
float_to_rgba	Yes	
fog	Yes	
fraction	Yes	
gobo	Yes	
image	Yes	Mip-map bias is not supported.
is_finite	Yes	
lambert	Yes	
layer_float	Yes	
layer_rgba	Yes	
layer_shader	Yes	
length	Yes	
light_blocker	Yes	
light_decay	Yes	
log	Yes	
matrix_interpolate	No	
matrix_multiply_vector	Yes	The matrix parameter is not linkable on GPU.
matrix_transform	No	
matte	Yes	Arnold 7 added GPU support for the matte closure, matte shader, and matte shape flag
max	Yes	
maya_layered_shader	Yes	
min	Yes	
mix_rgba	Yes	
mix_shader	Yes	
modulo	Yes	
motion_vector	No	
multiply	Yes	
negate	Yes	
noise	Yes	
normal_map	Yes	
normalize	Yes	
osl	Yes	Some limited support for closures and shading operations.
passthrough	Yes	
physical_sky	Yes	
pow	Yes	
query_shape	Yes	
ramp_float	Yes	Connected colors and positions not supported.
ramp_rgb	Yes	Connected colors and positions not supported.
random	Yes	
range	Yes	
ray_switch_rgba	Yes	
ray_switch_shader	Yes	

reciprocal	Yes	
rgb_to_float	Yes	
rgb_to_vector	Yes	
rgba_to_float	Yes	
round_corners	Yes	Trace sets are not supported.
shadow_matte	Yes	This initial version has a number of limitations currently, including: no support for indirect lighting, no AOV generation, and possibly incorrect self-reflections in shadow-matte objects.
shuffle	Yes	
sign	Yes	
space_transform	Yes	Camera and screen spaces are not supported.
sqrt	Yes	
standard_hair	Yes	extra depth and extra samples are not supported
standard_surface	Yes	Diffusion SSS mode is not supported. Transmit AOVs is not supported (so, for example, you'll get solid white in the alpha for transmission)
standard_volume	Yes	
state_float	Yes	
state_int	Yes	
state_vector	Yes	
subtract	Yes	
switch_rgba	Yes	
switch_shader	Yes	
toon	No	
trace_set	No	
trigo	Yes	
triplanar	Yes	
two_sided	Yes	
user_data_float	Yes	User data inherited from parent procedurals is not currently supported
user_data_int	Yes	User data inherited from parent procedurals is not currently supported
user_data_rgb	Yes	User data inherited from parent procedurals is not currently supported
user_data_rgba	Yes	User data inherited from parent procedurals is not currently supported
user_data_string	Yes	User data inherited from parent procedurals is not currently supported
utility	Yes	The edgelength, pixelerror, and nlights color modes are not supported.
uv_projection	Yes	
uv_transform	Yes	
vector_map	Yes	
vector_to_rgb	Yes	
volume_sample_float	Yes	
volume_sample_rgb	Yes	
wireframe	Yes	
Shapes		
box	Yes	Trace sets are not supported.
cone	No	
curves	Yes	Trace sets are not supported. Oriented curves are not supported.
cylinder	No	
disk	No	
ginstance	Yes	Trace sets are not supported.
nurbs	Yes	
plane	Yes	Trace sets are not supported.
points	Yes	Trace sets are not supported. Points rendered as a volume are not supported.
polymesh	Yes	Trace sets are not supported.
sphere	Yes	Trace sets are not supported.
implicit	No	
volume_implicit	No	
alembic	Yes	Trace sets are not supported.
procedural	Yes	Trace sets are not supported.
volume	Yes	Trace sets are not supported.
AOVs		
AA_inv_density	Yes	

ID	Yes	
N	Yes	
P	Yes	
Pref	No	
RGBA	Yes	
Z	Yes	
albedo	Yes	
background	Yes	
coat	Yes	
coat_albedo	Yes	
coat_direct	Yes	
coat_indirect	Yes	
cputime	Yes	
diffuse	Yes	
diffuse_albedo	Yes	
diffuse_direct	Yes	
diffuse_indirect	Yes	
direct	Yes	
emission	Yes	
indirect	Yes	
motionvector	No	
opacity	Yes	
raycount	Yes	
shadow_matte	No	
sheen	Yes	
sheen_albedo	Yes	
sheen_direct	Yes	
sheen_indirect	Yes	
specular	Yes	
specular_albedo	Yes	
specular_direct	Yes	
specular_indirect	Yes	
sss	Yes	
sss_albedo	Yes	
sss_direct	Yes	
sss_indirect	Yes	
transmission	Yes	
transmission_albedo	Yes	
transmission_direct	Yes	
transmission_indirect	Yes	
volume	Yes	
volume_Z	No	
volume_albedo	No	
volume_indirect	No	
volume_opacity	No	
Custom plugins		
BSDF	No	
Camera	No	
Color Manager	Yes	
Driver	Yes	
Filter	No	
Shader	No	
Procedural	Yes	
Procedural	Yes	
Imager	Yes	
Operators	Yes	