

OpenColorIO

Birds of a Feather 2018

opencolorio.org

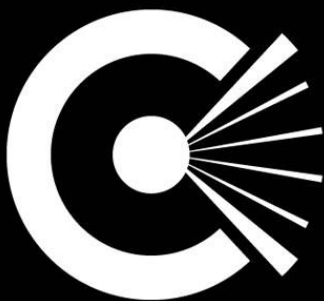
github.com/imageworks/OpenColorIO

github.com/imageworks/OpenColorIO-Configs

opencolorio.slack.com

ocio-dev@googlegroups.com

ocio-users@googlegroups.com



Agenda

- **Project Update**
Michael Dolan (SPI)
- **OCIO v2.0 Update**
Doug Walker, Patrick Hodoul (Autodesk)
- **GPU Renderer Case Study**
Michael Dolan (SPI)
- **Foundry Nuke Plugin Discussion**
Tony Micilotta (Foundry)
- **Built-in Transform & Color Science Lib Discussion**
Mark Boorer (ILM), Sean Cooper (DNEG)

OCIO Leadership



SPI Team

- Brian Keeney (SPI Chair)
- Larry Gritz (Software Architect)
- Michael Dolan (Color Scientist)

Autodesk Team

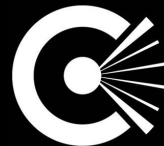
- Doug Walker (Project Lead)
- Patrick Hodoul (Software Eng. Lead)
- Bernard Lefebvre (Software Engineer)

Admins

- Sean Cooper (DNEG)
- Mark Boorer (ILM)

OCIO v1.1.0

Released Jan 12, 2018



Info

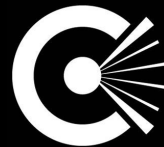
- GitHub branch: RB-1.1
- GitHub release: v1.1.0
- Included in VFX Reference Platform CY2019 DRAFT

Updates

- libcpp build fixes
- yaml-cpp > 5.0.1 support
- yaml-cpp & TinyXML patches
- Clang visibility fix
- Truelight LUT write support
- Improved OCIOYaml
- Python string corruption fix
- CDL support
- Updated documentation
- Added args/kwargs support to Python MatrixTransform
- Added Look description field
- Improved Python 3 compatibility
- CSP file read fix
- Linux, Mac, and Windows continuous integration
- Improved 1D LUT extrapolation & negative handling
- Improved cross-platform builds
- Undefined role crash fix
- After Effects plugin updated
- Reference Photoshop plugin
- Reference Docker image

OCIO v2.X.X

Active development

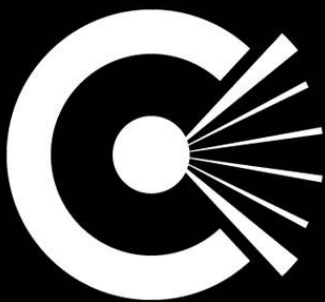


Info

- GitHub branch: master
- Autodesk led development

Updates

- New GPU API
- ICC profile read support
- Discreet 1D LUT support
- Iridas cube 3D LUT write support
- Improved OCIO Exception class
- Extensive unit test expansion
- Photoshop and After Effects plugin updates
- Build system improvements
- Expanded documentation

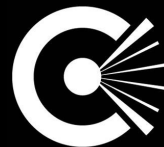


OCIO v2.0 Update

Doug Walker (Autodesk)

Patrick Hodoul (Autodesk)

OCIO v2.0 Overview



Info

- Project proposed to community at SIGGRAPH 2017
- Work is underway at Autodesk (team of three)

Features

- Improved GPU renderer
- Improved CPU renderer
- Inversion of all transforms
- Academy/ASC CLF support
- Autodesk CTF support
- ICC monitor profile support
- Better unit test coverage
- Rigorous ACES transforms
- Built-in common color transforms
- Additional reference space
- Config color space interchange
- An API for manipulating configs
- More color space metadata
- Improved per-shot Looks

OCIO v2.0 Accomplishments



Live demo in Flame

- Improved GPU renderer (including tetrahedral Lut3D)
- Inversion of all ops (including Lut3D)
- ICC support
- CLF support
- Enhancements of Lut1D, CDL, new Range op

Mentions

- Hundreds of new unit tests, including GPU
- Legacy Discreet Lut1D format support
- Windows build fixes, new Docker file



OCIO v2.0 New GPU Renderer

OCIO v1 GPU renderer was inaccurate

- Used a “baked” approximation

OCIO v2 GPU renderer now matches CPU

- Renders each op exactly
- Supports any number of LUTs, now only a hardware limitation
- Legacy GPU renderer and baking functionality are also preserved

OCIO v2 GPU generic public API

- Allows other languages to be added
- Allows customization to the needs of various applications
- Complete OpenGL implementation provided

OCIO v2.0 Validating Production Readiness



CPU unit tests

- Increased from 70 to over 400 tests

OCIO now has GPU unit tests!

- Allows comparison to CPU renderer to be validated
- Using the OpenGL implementation of the GPU public API
- 90 unit tests for now
- Easy to write



OCIO v2.0 New Tool Features

ocioconvert

- Added support for GPU processing via the new API
- `--gpu` for the new GPU processing
- `--gpulegacy` for the legacy 'baked' GPU processing

ociodisplay

- Updated to the new GPU API
- `-gpuinfo` to dump the GPU shader program
- `-gpulegacy` for the legacy 'baked' GPU processing



OCIO v2.0 Next Steps

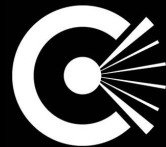
Large pull request just uploaded for your review

- Academy CLF support

Up next for Patrick, Bernard, & Doug

- Autodesk CTF (enhanced CLF) support
- Rigorous ACES transforms
- Display-referred reference space
- ... and more!

OCIO v2.0 Get Involved!

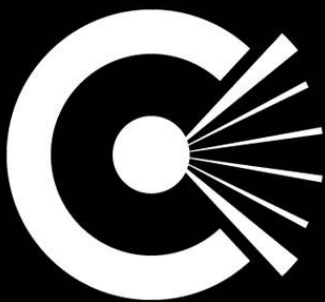


Please get involved!

- As a developer (C++11, Python bindings, unit tests, ...)
- As a tester

OCIO v2.0 Working Group meeting

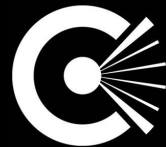
- Wednesday, August 15th, 2:00 – 3:00, Pan Pacific Hotel, Oceanview #4
- Also contact us to join the mailing list: ocio-v2@googlegroups.com



GPU Renderer Case Study

Michael Dolan (SPI)

OCIO v2.0 GPU Renderer in SPI's Itview



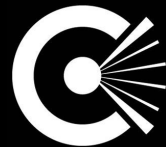
Itview

- Academy Award®-winning review tool developed and used internally at Imageworks.
- Rendering pipeline built around the GPU implementation of OCIO DisplayTransform.
- Color accuracy bound by OCIO GPU renderer precision, which inversely impacts performance as 3D LUT edge length increases.

OCIO v2.0 Integration

- Development version built against OCIO master branch for testing.
- GenericGpuShaderDesc implemented to test color parity between Itview and Nuke.
- Precision matches Nuke's CPU OCIO implementation without negative performance effects.
- Console shader debugging invaluable for validating color transforms.

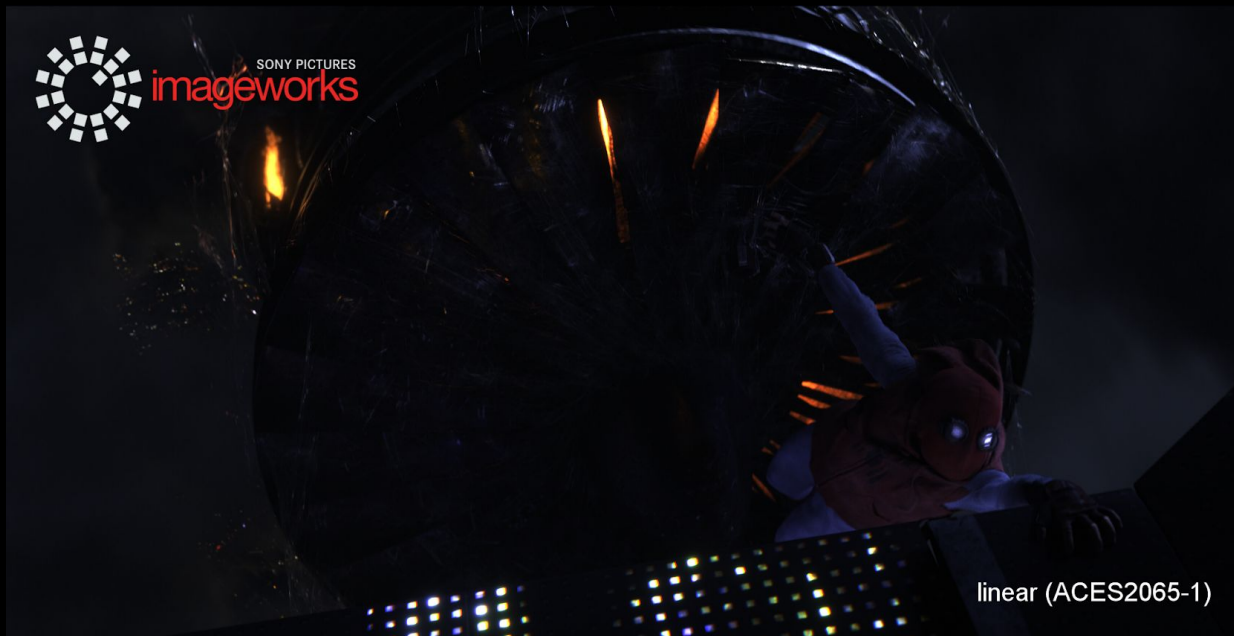
OCIO v2.0 GPU Renderer in SPI's Itview



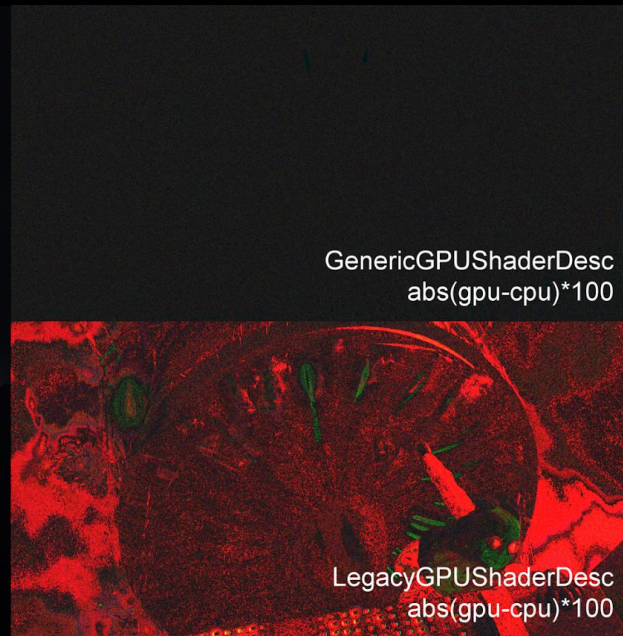
GPU Renderer Comparison

- Captured display encoded Itview buffers using GenericGpuShaderDesc and LegacyGpuShaderDesc.
- Captures compared with a CPU rendered image in Nuke.
- Resulting “error” maps represent absolute RGB deltas, amplified by a factor of 100.

OCIO v2.0 GPU Renderer in SPI's Itview



linear (ACES2065-1)



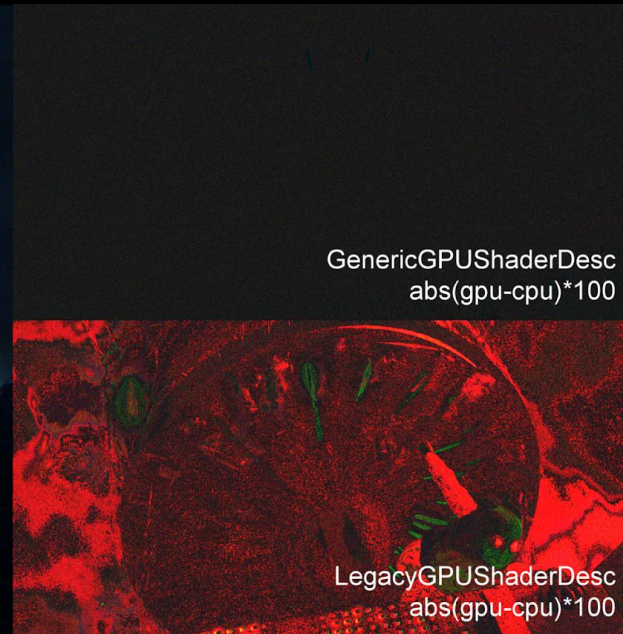
GenericGPUShaderDesc
abs(gpu-cpu)*100

LegacyGPUShaderDesc
abs(gpu-cpu)*100

OCIO v2.0 GPU Renderer in SPI's Itview



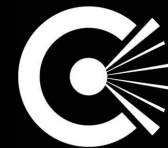
display transform (ACES RRT + sRGB ODT)



GenericGPUShaderDesc
abs(gpu-cpu)*100

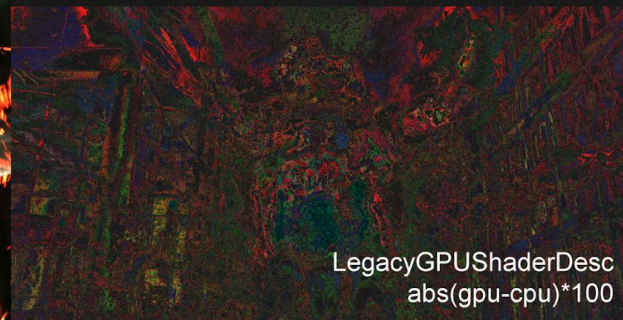
LegacyGPUShaderDesc
abs(gpu-cpu)*100

OCIO v2.0 GPU Renderer in SPI's Itview



linear (ALEXA wide gamut)

GenericGPUShaderDesc
 $\text{abs}(\text{gpu-cpu}) * 100$



LegacyGPUShaderDesc
 $\text{abs}(\text{gpu-cpu}) * 100$

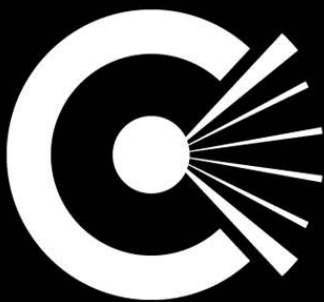
OCIO v2.0 GPU Renderer in SPI's Itview



display transform (sRGB film LUT)

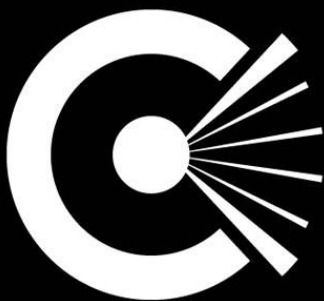
GenericGPUShaderDesc
abs(gpu-cpu)*100

LegacyGPUShaderDesc
abs(gpu-cpu)*100



Foundry Nuke Plugin Discussion

Tony Micilotta (Foundry)

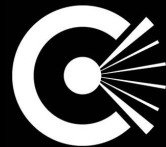


Built-in Transform & Color Science Lib Discussion

Mark Boorer (ILM)

Sean Cooper (DNEG)

OCIO v2.0 Built-in Transform Proposal



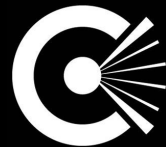
Goal

- Enable common configs to have no external dependencies
- OCIO would generate many common building blocks on-demand
 - E.g., everything in the ACES config plus some other commonly used transforms
- Used by config authors (as they see fit) when defining their color spaces

Example

```
- !<ColorSpace>  
  
  name: Input - ARRI - V3 LogC (EI800) - Wide Gamut  
  
  to_reference: !<BuiltInTransform> {src: LogC-EI800-AWG, dst: ACES}
```


OCIO v2.0 Built-in Transform Proposal



Implementation

- External OpenColorMath C++ library
- CPU and GPU support
- Plentiful Unit Tests
- Complete formulaic implementation of ACES transforms
- Tight integration with ACES development - TBD

Open Questions

- Verbosity of colorspace names
- Versioning