

The Atmosphere of Raya and the Last Dragon

Marc Bryant
Walt Disney
Animation Studios

Ryan DeYoung
Walt Disney
Animation Studios

Wei-Feng Wayne
Huang
Walt Disney
Animation Studios

Joe Longson
Walt Disney
Animation Studios

Noel Villegas
Walt Disney
Animation Studios



ABSTRACT

The cultures of South-east Asia provided plentiful inspiration for the setting and art direction in Walt Disney Animation Studios' "Raya and the Last Dragon". This fantasy adventure required many unique environments ranging from desert landscapes to tropical forests, each describing rich lighting scenarios paired with the appropriate atmospherics.

Many departments collaborated to create the extensive amount of atmospherics required by such varied and lush locations. Simultaneously, emphasis was placed on making the atmospheric Lighting workflow more efficient. We focused on improvements to allow Lighting artists more flexibility and control over making complicated atmospheric setups without having to request new assets or assistance from the Effects department on every shot. This in turn would save time and relieve significant production strain.

CCS CONCEPTS

• **Computing methodologies** → **Rendering**; *Volumetric models; Simulation by animation.*

KEYWORDS

lighting, fx, volumes, rendering, atmospherics

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1 ATMOSPHERIC INTEGRATION

Environmental realism and believability were important to the directors and atmosphere would be a key player in helping to give the film its motivated, naturalistic lighting with an extra focus on tonalism. This meant that atmosphere would be used as a tool

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to create silhouettes, attenuate light, and craft large tonal masses. Knowing this, Lighting artists would require access to a wider range of volumetric assets than in the past. In addition, show leadership placed great emphasis on a "Rough to Fine" workflow, including early cross departmental sequence based reviews (show early with as much context as possible). We would therefore need a more efficient way of set-dressing these new assets as well as an entirely new way to publish from Lighting so that the other departments could see where the sequence was headed.

Clearly this called for a close collaboration between the Effects, Lighting, and Software teams. We needed an efficient library of realistic atmospheric elements from which to build our environments.

2 EXTENDING OUR TOOLSETS

Disney Animation already had a solid framework for cross departmental Effects asset collaboration. Our Foundation FX toolset had been used extensively in the past by the Layout department [Bryant et al. 2017]. Several improvements were needed in order to support Lighting's heavy use of volumetric assets.

Atmospherics needed to be visible in cross departmental reviews, so Lighting needed more than the ability to place and render assets, but also to publish their atmospherics back into the pipeline.

Furthermore, Lighting artists needed the ability to quickly place and visualize many assets, with the expectation that the volumes in Disney's Nitro interactive display would closely match the final render. To better support the interactive placement and preview of heterogeneous volumes, we replaced Nitro's previous volume slicing approach with a full-resolution, fixed-step ray marching fragment shader, with first hit optimizations and blue noise offsets.

To support the artist controlled parameters from our final frame renderer's volume material model (e.g. albedo and extinction color) in real-time, we started with a single scattering model with wavelength independent transmittance. Multiple scattering was approximated using Bauer [2019]'s approach, adding multiple octaves of direct light while increasing isotropy. Inter-volume transmittance was approximated via Order Independent Transparency, while shadowed illumination for volumes required optimizations to real-time shadow mapping techniques. This approach enabled volumetric assets to live alongside traditional opaque and translucent surfaces.

3 RENDERER IMPROVEMENTS

Disney Animation's final frame renderer, Hyperion, also required a few upgrades.

