The Power of Atomic Assets: An Automated Approach to Pipeline on *Legend of the Guardians: The Owls of Ga'Hoole*

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Figure 1: *Automated review (left) and final rendered frame (right).* ©*Warner Bros. All rights reserved.*

Abstract

The vast fantastical world of "Ga'Hoole", which ranged from deep pine forests to rocky canyons and vast deserts, was populated by a multitude of creatures brought together to play out a unique adventure.

Each of the characters and environments posed a complex set of technical and production problems such as extreme closeups, environmental interaction, and complex animation, while the complexity and volume of assets (2,805,522 asset versions in total) made it essential that the pipeline would promote reuse, QA and ease of management.

This talk focuses on the pipeline concepts and production methodologies that underpin the visual richness of *LotG*.

1 Break It Down to Build It Up

Core to our approach in handling complexity and scale was the concept that each dept delivered only its simplest "atomic" components. Animation delivers motion (animation curves) for example, rather than rigs or geometry. Each review or delivery item is then procedurally built to ensure repeatability and quality. Developed during *Happy Feet*, this idea was further developed on *LotG* with the creation of our core *ShotSetup* pipeline framework.

The resulting toolset enabled artists to construct, reconstruct, and deliver only the elements they required. We ensured stable inputs with the continued evolution of our *Package* system from *Happy Feet*[Peers et al. 2007], while recording input dependencies of generated assets enabled accurate tracking of the vast quantity of data produced (460Tb in total)

The potential of atomic assets was further exploited with the use of a configurable event-driven system for our asset management software *ARK*, responding to asset checkins, production breakdown changes, or even artist timesheet entries. This could trigger anything from email notifications to the generation of environments or complex feather simulations, built using *DEX*, our node graph-based distributed execution system.

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2 Automated Reviews for the Masses

ARBS or *Animal RenderBoy System* could be triggered per department based on various events, and was configurable to include/exclude elements such as materials, feathers, DOF, foliage, environments etc. depending on the requirements of the review.

Reviewing material early in the pipeline forced a QA step, which despite initially slowing progress, had the obvious benefit of ensuring assets would be fixed prior to downstream departments receiving them. Particularly towards the end of production, *ARBS* facilitated the flow of material we needed.

We maximised asset throughput by automating review renders and refining quality settings per department while scheduling automated submissions to balance CPU utilisation over the course of the day.

3 Always Leave It the Way You Found It

With complexity and parallel production occurring as a matter of necessity, good data management was essential. Having robust asset dependencies we could confidently automate the removal of data during production. This ensured that all active scenes and shots were automatically managed on a daily basis to have the leanest possible disk footprint, and when a shot was finalled it could be cleaned up almost immediately.

4 Summary

With no animated feature film having ever attempted feathers and foliage on such a large scale, *Animal Logic* had to further evolve its animation pipeline to more efficiently break apart and reconstruct on demand each department's required assets. The pipeline offered configurable functionality at each stage while offering end-to-end automation when required.

References

PEERS, D., HORE, N., SARSFIELD, A., GUNSBERGER, B., AND MARSHALL, J. 2007. "happy feet": thawing the cg pipeline. In *ACM SIGGRAPH 2007 special sessions*, ACM, New York, NY, USA, SIGGRAPH '07.