

A Holistic Approach to Asset Quality and Efficiency

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ABSTRACT

ILM is known for the aesthetic quality of its assets, as well as the great volume and diversity of its vfx work. We describe here our holistic work on asset efficiency, that ensures that our thousands of assets are constructed efficiently, and pass across disciplines in an optimized fashion. Our approach is comprised of several major components that have been used together in a novel way: an application agnostic sanity check framework, extensive asset analytics, and a QC movie and review system.

CCS CONCEPTS

• **General and reference** → *Reliability; Measurement; Metrics; Evaluation; Performance; Validation; Verification*; • **Human-centered computing** → *Visual analytics*; • **Computing methodologies** → *Animation*; • **Software and its engineering** → *Software performance; Software reliability; Reusability*;

KEYWORDS

Asset Efficiency, Asset Quality, Asset pipeline, Asset management, Asset Validation, Sanity Checks, Analytics, review, QC

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1 INTRODUCTION

Over the years, movies have been pushing the limits in terms of complexity. Back when the number of characters in a movie was smaller, we used to have some luxury where people could manually look after characters, but with the current pace of productions, and ever-growing complexity of CG work, developing a holistic technical approach to asset QC is critical. Furthermore, the trend in the industry to use the best tool for the job increases the number of applications being used and further aggravates the problem. We believe that our approach covering different parts of the pipeline is novel, and only parts of it have been done before by others. The current pipeline has taken several years to create and is comprised of 3 main pieces: a sanity check framework to validate assets before they are published into the asset management system, a comprehensive sets of analytics to evaluate asset quality, and a QC movie

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Figure 1: Example of asset metadata accessed via pixel inspection.

and review system, to capture any post-publish issues and to help with troubleshooting them.

2 SANITY CHECK FRAMEWORK

The best asset QC is to fix the issues before they even get into production. Our framework allows standard sanity checks to be authored and implemented easily using an application agnostic command library. Checks can be run interactively by artists via a standard UI, or run in batch. For instance, every single model that enters the pipeline goes through a sanity check toolset in the model/texture department before passing on to other disciplines. This allows artists to catch and fix errors, and also raises targeted notifications of key conditions that have ramifications for other departments, for instance if the pivots of some geometry pieces have been changed. The output and history of these sanity check runs are recorded with each revision of the asset, allowing for analysis and understanding of trends, as well as aid in troubleshooting.

3 ASSET ANALYTICS

Post-publish of models and rigs, automated asset analytics are triggered and evaluate and record in-depth data about each revision. For example, after rig checkins, a series of performance tests are run, which include animation playback speed, memory usage, cache export time, or file load/unload times. Finally a detailed analysis and breakdown of all the components contributing to the rig efficiency are profiled as well. Dedicated dashboards are provided to the users, depending on their discipline and roles. For instance, the critical, actionable data around rig performance is displayed in a highly customized rig analytics dashboard. It allows for fast visual

correlation between rig performance changes and rig check-ins or software changes. If a rig has become significantly slower than a previous version, a rigger or supervisor can quickly view what the greatest differences are between those two revisions.

Furthermore, we have implemented automated alerts for certain conditions that warrant immediate attention - for example, when a simple animation rig has slower performance than a renderable detailed rig, alerts are generated via the analytics system, so that the problem can be remedied immediately.

Each asset authoring discipline has its own customized dashboard that intuitively highlights the aspects of the model for which that discipline is responsible (e.g., “model dashboard” highlights mesh count, vert count, “rig dashboard” highlights rig playback speed, “lookdev/lighting dashboard” highlights render times etc.). At a higher level, there is a broader “asset dashboard” that summarizes asset performance across all aspects, and includes impact of asset on the pipeline overall including cross-disciplinary functions such as alembic cache generation times. This higher level dashboard is used by show CG supes and discipline supes to manage and improve overall efficiency of specific assets, as well as to view and manage the overall asset efficiency of the show, in relation to other shows and studio benchmarks.

4 QC MOVIE AND REVIEW SYSTEM

As a final QC step, asset checkins trigger the generation of QC movies to evaluate all aspects of the asset for correctness and efficiency.

For instance, we render the new asset revision animated with either generic motion cycles or a selection of actual shot animations. These automatically generated QC movies are then sent to the relevant artist(s) for review. Shot updates of those assets (whether due to rig updates or animation updates) similarly trigger generation of QC movies of those shots.

Movie review is tied to a sophisticated QC Movie Approval System that allows artists to approve or disapprove their assets and shot animation. The QC tool is integrated with our technical support system, so that if artists see a problem with their assets, they can generate a support ticket that is properly logged and tracked by production. Dependency logic is used to determine which downstream departments and artists are affected by asset updates, and selectively sends these QC movies to them in the most logical order.

QC movies also have advanced capabilities to assist artists with troubleshooting, such as being able to load and inspect alembic caches of the asset/animation in a custom 3d viewer which allows 3d diffing of multiple revisions, as well as fast 2d-only tools for revealing asset metadata simply by hitting a hotkey with the mouse cursor over that asset in the rendered image.

The QC movies are controlled by a UI that enables configuration of the render templates. Templates can be customized per asset, per shot, per sequence or by show. For example if a certain asset requires detailed close-to-actual hair renders, the customization UI can be used to specify a template with fairly high quality hair rendering enabled. Or, if a certain sequence has very hero facial performance, higher quality settings for lighting and shading can be enabled so that the QC movies offer a good approximation to final render. The customization UI makes it very easy and intuitive

for CG and discipline supes to tweak their QC movie templates and settings to suit the needs of each asset and each sequence/shot, over the life of the show.

Furthermore, the render parameters can be set up to automatically adjust as certain conditions of the shot occur - for example, ambient occlusion can be turned on once corrective sculpt work begins, or hair renders turned on once creature simulation work begins, etc.

5 CONCLUSIONS

In summary, we have presented a holistic approach to asset quality and efficiency. Each part of the asset pipeline provides tools to catch issues as early as possible, and to facilitate troubleshooting. We think that this suite of tools individually have capabilities that have never been achieved before, and have never been connected together in a coherent pipeline. Our systematic approach is one of the keys to our success in handling volume and complexity.