

A Pipeline for 800+ shots

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Abstract

The Chronicles of Narnia: Prince Caspian presented a new and unique challenge to London's VFX industry. The complexity and volume of Caspian forced MPC to dramatically rethink their pipeline in just 18 short months. By the end of production MPC had finalised 865 shots. This talk will document the pipeline that we developed to meet this challenge, paying particular attention to asset management, character build and lighting.

1 Pipeline Changes

To complete a show the size of Prince Caspian in the time available, we decided to take a multi-tier production-line approach, enforcing strict rules on such things as naming conventions; building tools and workflows to allow different disciplines to work in parallel wherever possible, and to automate many of the repetitive tasks artists encounter day to day.

MPC's old asset management system revolved around the versioning of individual elements such as models, rigs, and animation caches stored in a hierarchical structure based around job, scene, shot, asset type, asset and version. It quickly became apparent that this was not going to be sufficient to manage the complexity required for a project like Caspian. We need a system that could store the relationships between assets and their dependencies on each other. This would be required in order to validate functionality between assets as well as providing production and artists the ability to identify the status of the asset within the pipeline. For example, if for a particular character a new model was released with an updated topology, all existing animation caches would not work with the new model and would need to be regenerated. The definition of these relationships should allow, for example, the automatic generation of an animation cache when the animation curves or underlying models change. To accomplish this, the concept of a "Package" was defined as a structured grouping of multiple types of assets or components (e.g. Models, rigs, and animation curves) that could each be version controlled in its own right. Therefore a Package consists of a hierarchical list of assets, the dependencies between those, and the rules to govern the regeneration of one asset should its upstream/downstream dependencies change.

MPC's pipeline is based around a proprietary C++ library, known as "Muggins" which contains many algorithms and data structures useful for 3D applications. Muggins interfaces with Maya, RenderMan, OpenGL and mentalray, among others, and is bound to the scripting languages lua and python to allow dynamic creation, manipulation and visualisation of geometry and other 3D data both within Maya and the final renderers. These scripting language bindings, collectively known as "Giggle", provide the means to define Package structures, display these as OpenGL previews within Maya and as renders out of RenderMan.

Very early in the project it became clear that given the short timeframe, additional features had to be added to packaging to allow a parallel workflow between the different departments. First, an approvals system was implemented in order to control the flow of assets through the system. Lighting artists would only be able to gather AnimatedCharacterPkgs built from approved CharacterPkgs

into their scene, for example. This was important as it let us verify that an asset was working correctly before propagating it into shots. We also implemented the concept of streams: separate packages for different disciplines that were independent of each other and contained slightly different information. This meant that artists working at different stages of the pipeline could release and update packages without worrying about their changes breaking someone else's scenes. Once packages were approved, the necessary information could be copied between streams to synchronize the data they contained and make sure everyone was working with the latest assets.

With so many shots to present and so many characters in each shot, preparing animation dailies to show the client for approval became a laborious process using standard Maya playblasts. Thus, we used the OpenGL interface to our scripting system to quickly batch render previews of dozens of shots at a time on the render farm. Not only was this vital for presenting animation for client approval, it allowed us to quickly verify that every asset in a shot was working before passing off to lighting for final rendering.

2 Production Summary

Even-though one might get the impression that the pipeline was working smoothly it had multiple problems. Given the late development and roll-out of the new features, sequences that had already been started worked outside of the pipeline. As the short timescale never allowed these sequences to be incorporated back into the new pipeline it became tiresome to support both the new pipeline and the old, temporary workflows. In addition, the sheer volume of data generated and processed during this project, combined with the large number of artists working on the show, inflicted severe stress on storage and backup mechanisms, databases, network, filesystems, and MPC's proprietary webservice based infrastructure. Caspian required full support from IT, Systems and R&D during the duration of the project to address these issues immediately whenever they occurred and to enable MPC to deliver the movie without show-stopping interruptions to services. An ongoing area of development is the integration of production tools into the packaging asset management system. Expressing the concept of a package in a transparent form to our production teams has proved to be a challenge, with reports and inspection utilities either providing too much, or too little information. However, the ability of the support team to script the asset management system, define automation rules, and setup parallel workflows to generate mass updates and detailed shot status reports as required by production has been a success.

The Chronicles Of Narnia: Prince Caspian presented MPC with a new and unique challenge that tested every part of the pipeline to the limit. To achieve the high standard of work required in the short timeframe we developed a new pipeline based around common working practices and conventions, an automated asset management system and parallel workflows between disciplines. The result placed a strong emphasis on effective scene management but was necessary to guarantee the fast delivery of high quality work whilst still allowing the artist creative freedom within the remit of their shot. With the show complete we can now leverage the techniques developed on Caspian and give MPC a strong foundation from which we can more efficiently deliver future shows, exceeding expectations in a highly competitive market place.

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