openPipeline: Teaching and Implementing Animation Production Pipelines in an Academic Setting

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1   Introduction

Organization and collaboration are key components to creating a successful animated film. Every studio implements a pipeline for how they will complete their film both from the point of view of planning and scheduling, and how they will manage their data across the length of production and across artists. The openPipeline project is an attempt to create a production pipeline framework specification and tool set to both educate and empower student and independent animated film production. Students often overlook issues such as production trees, automatic file naming, revision control, collaborative notes, and scene population. These ideas are all critical components to commercial production studios and valuable to the student and independent production.

A production tree is the organization of assets needed to create the film. This is defined early in the planning stages and lays out the folder hierarchy where assets are stored to eliminate confusion and to define data storage in predictable locations. Automatic file naming is the automation of asset and asset revision naming by the production system. This reliance on the pipeline lessens the chance of misnaming an asset and allows the artist to focus on the work needed to be done. It also automates the flow of data down the pipe. Similarly, revision control is the key to working in a non-destructive manner. Each time an artist saves an asset it does not overwrite the current file, but actually saves a new file with an incremental value. Overwriting a file on disk runs the potential of losing data and corrupting the file if the system crashes while saving. Incremental saving eliminates that possibility at the expense of a larger file space requirement. openPipeline also implements the notion of artists working in a sandbox (called the "workshop") and only mastering (ie: publishing) an asset when it is ready for the rest of the pipeline. This insulation allows an artist to work independent of the active pipeline. Each asset directory is composed of the published asset file and sub-directories for notes, workshop, version files and asset components. Communication needs to be tied to the asset so that artists may work simultaneously and alternately on components of the project. With this in mind, collaborative notes are associated with every save of an asset in openPipeline. Every save records the user's login, the date and time of the save, and the type of save (workshop or master), in addition to providing the opportunity for user notes.

The final step is the act of scene population, which is where the artist loads the required assets into the production scenes for animation, lighting, and rendering. In addition to basic asset referencing, we have also implemented a means of getting a scene inventory. Like the asset library list, the scene inventory provides a bird's eye view on the work in progress without needing to open every file. The openPipeline framework proposes a structure for all of these ideas.

2   Initial Implementation

The initial implementation is a free, open-source, and community accessible Maya Embedded Language (MEL) collection for Autodesk Maya. The code is hosted on Source Forge, as is the documentation, allowing for others to edit and update the codebase for the project. All implementations of the openPipeline framework are intended to be free, and we welcome studios using the framework in a commercial setting to introduce innovations back into the open-source codebase. Every studio develops such a tool in one way or another. The hope is that by making it an open conversation, not incumbered by specific production concerns, a common framework can emerge across production environments. Implementations for other software packages have been discussed and we encourage development and collaboration in this area.

3   Results

openPipeline for Maya has been used on test projects at Pratt Institute by students in the Department of Digital Arts with great success. It is slated for use in an upcoming collaborative animation production studio class and has been a useful tool to demonstrate the concepts it implements from the studio level class to the technical MEL Scripting classes. Students were generally excited about the project and having a built-in means of organizing their data. They felt that the small learning curve was outweighed by the experience and knowledge of learning how production pipelines worked first-hand. It is being used on a number of short independent films and the developers are already getting feedback from small studios who are actively using it in production of commercials and TV shows. At the academic level, it provides a real world tool to use as a guide for teaching the practicalities of production. By providing our students experience with these ideas, they get up to speed in real world production environments. Once comfortable they are able to rely on the pipeline and focus on the artistic challenges ahead, both in the commercial setting and for their own work.

4   Future Directions

The Maya implementation is continuing to develop and as we include more schools on the roster of those using it, we hope to see it strengthen and become a production tested tool. More use will ideally also attract more developers, both at the academic level and experienced professionals. Because of the open source license we welcome commercial studios to adopt and augment this framework and the associated implementations. We also welcome student developers, and the Source Forge project allows for access to the source code, documentation, and a code review process. There are plans as well for a stand alone openPipeline application that will manage production and data across applications for larger projects. We hope that by defining and supporting an open conversation about animation production pipelines that students and independent productions are empowered and that small studios have a solution or potentially a starting place for production pipeline development.

`http://openpipeline.sourceforge.net/`

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