# Enhancing and Extending DSABR: A Distributed System for Automated Blender Rendering

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## 1 Proposal

Last year, with the support of ORSP, we developed a collaborative animation rendering system called DSABR (Distributed System for Automated Blender Rendering). Due to the growing demand for increasingly complex digital 3D modeling and animation, we built a software application that harnesses the computing resources of multiple networked machines to speedup the rendering of digital animated videos. Given a file that contains a description of an animated scene, DSABR distributes the work required to generate an animation to multiple machines, gathers the results, and generates a final video file.

For instance, using DSABR and computing resources at both UWEC and the Center for High Throughput Computing at UW-Madison, we were able to reduce the rendering time for a video that took 72 minutes on a single machine down to 5 minutes using our system. Such dramatic speedups are vital for both reducing turnaround times for artists and for increasing the total number of videos that can be generated in a reasonable amount of time.

This year we wish build off the success of DSABR by enhancing and extending the application. First, we wish to add support for Maya. Currently, we only support rendering Blender animation videos. While Blender is a capable tool, Maya is the industry standard and has been recently adopted by both the Computer Science and Art departments as the primary digital animation application. We wish to extend DSABR to support both Blender

and Maya so that students familiar with either tool can take advantage of fast rendering times. To the best of our knowledge, there is no distributed rendering system that supports both Maya and Blender (current software generally supports one or the other).

Second, we plan on benchmarking and testing the system with computing resources from commercial cloud platforms such as Amazon EC2 or Windows Azure and from national grid infrastructure such as the Open Science Grid (OSG) or the Extreme Science and Discovery Environment (XSEDE). Currently, our system is capable of utilizing resources from UWEC and UW-Madison. We wish to experiment with using cloud and national grid resources to examine the performance impact of these systems. Our goal is to understand and profile the use of multiple types of distributed systems in a single application, which is a current area of focus for the distributed computing research community.

Third, we will develop a web portal to allow users to interface with DSABR in a simplified manner. Currently, using our software requires logging into a cluster and invoking a series of terminal commands. Because this is a rather unfriendly interface for non-technical users, we wish to develop a web portal that serves as a front-end for DSABR. With this system, a user simply logins to a website, uploads their animation file, sets a few parameters, and hits a button to begin rendering. The website will utilize DSABR to render the video and the final result will be shown as an embedded video via the portal. This streamlined system will enable novices and non-technical users to take advantage of our work.

Our overall goal is to perform interesting computer science research and to produce a useful distributed animation rendering system. Benchmarking the system on various cloud and grid platforms supports the former goal, while adding support for Maya and building a web portal aids in the latter. Given the expertise of the faculty and the student[1], we believe these goals are reasonable and attainable this year.

[1]Because of his research experience last year, Travis was invited to the OSG Summer School at UW-Madison this summer and received extensive training on using distributed systems such as OSG and XSEDE

# 2 Objectives

For this project, we expect to meet the following objectives:

1. Support Maya as an alternative animation backend.
2. Utilize computing resources from the commercial cloud platforms and from national computing grids in rendering animations.
3. Develop a web front-end for distributed system.

In addition to these goals, we wish to collaborate with faculty in both Computer Science and Art to find users for our system. This means allowing students and faculty to utilize DSABR for either class or various scholarly activities.

# 3 Responsibilities

The student is responsible for investigating the requirements for supporting Maya animations and for extending DSABR to accept Maya input files. Likewise, the student will benchmark the scalability and performance of DSABR when using a mixture of local cluster resources with commercial cloud platforms and national grid infrastructure. Moreover, the student is responsible for designing and implementing a web portal that provides users with a simplified interface to DSABR. Finally, the whole research process will be documented via a blog that serves as a digital research journal.

The faculty mentor will meet with the student on a weekly basis to ensure steady progress and will contribute his technical expertise when necessary. In particular, the faculty mentor will provide support in administrative tasks such as configuring computing systems and procuring resources. Additionally, the faculty collaborator will assist in testing the software and prototyping possible research paths.

# 4 Dissemination

We hope to present the results of our research in the following venues:

1. A paper at the Midwest Computing and Instruction Symposium (MICS).
2. A poster or presentation at the Celebration of Excellence in Research and Creative Activity (CERCA).
3. A presentation at HTCondor Week at UW-Madison.

If appropriate, we will also submit a poster or paper to a distributed computing workshop or conference.

# 5 History

This project was funded by ORSP last year under the title "Collaborative Animation Rendering System."