# Parallel Path Tracer
Stuart Maier
Computer Systems Lab 2009-2010

## Abstract

Computer generation of highly realistic images has been a difficult problem. Although there are algorithms that can generate images that look essentially real, they take large amounts of time to render. This project explores ways of distributing that onto multiple computers, in order to speed up the process.

## Background and Introduction

This project is a combination of two parts: the graphics part and the parallel part. The graphics part is based off of established work in computer graphics rendering. The main method of generating realistic computer generated images is the path tracer, which shoots off rays to generate the scene. The parallel part is based off of the BOINC framework, which works with independent clients which only talk to the server at the beginning and end.

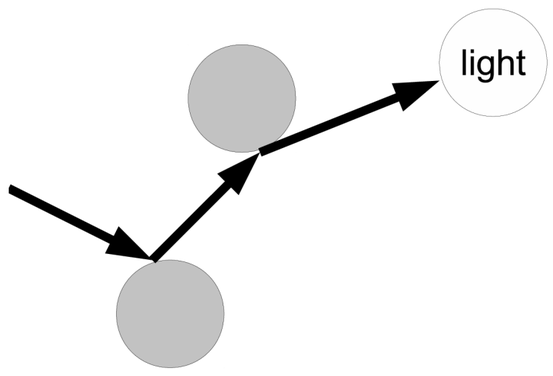


Fig 1: The process by which the rays are generated to create the scene.

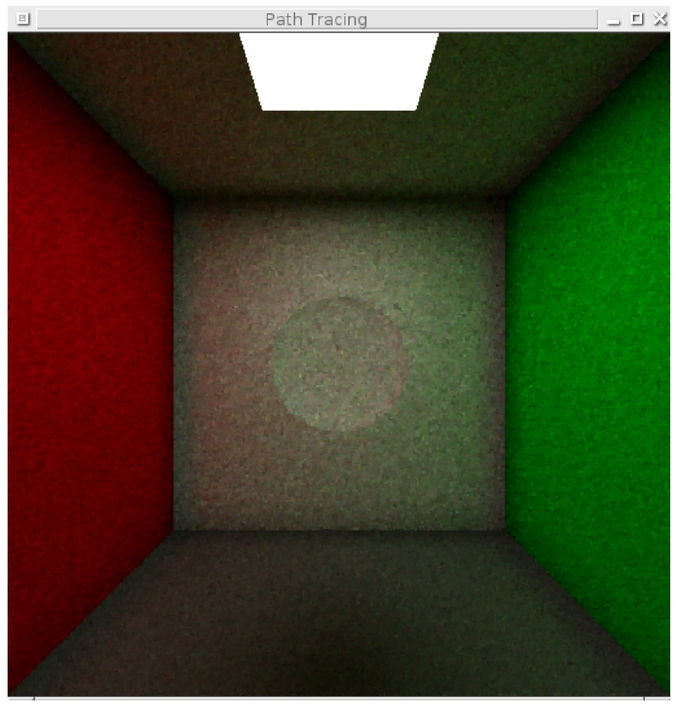


Fig 2: The final output of a rendered scene.

## Discussion

Currently, the path tracing part of the project has been implemented, as seen above. It is able to generate a scene that looks realistic and it exhibits properties of real light. It also contains RGB versions of the Cornell Box colors. However, more work needs to be done to create truly realistic scenes. As far as the parallelism goes, there is a somewhat developed system that provides adequate parallelization as well as speedup, but there is room for improvement by changing to a more robust parallel system.

## Results and Conclusions

Currently, not too many results can be drawn from this experiment. The most computationally intensive part of the project, the transition to spectral rendering, has not been implemented yet. Thus it is difficult to tell how well parallelization is able to speed up the generation of highly realistic images.