

# COMP410 Project Proposal

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## Introduction

Ray tracing is a powerful technique used in computer graphics to generate realistic images by simulating the behavior of light in a scene. With its ability to produce highly detailed images with realistic lighting and shadows, ray tracing has become an increasingly popular tool for creating visual effects in [movies](#), video games, and other digital media.

## Brief Overview

In this project proposal, we will explore the fundamentals of ray tracing and its applications in computer graphics. We aim to develop a ray tracing system that can generate high-quality images.

The proposed project will involve learning the underlying principles of ray tracing, including the physics of light and optics, and implementing them in a software package. We will also explore various optimization techniques for improving the performance and efficiency of the ray tracing engine, including parallel processing.

Upon completing the project, we aim to gain a comprehensive understanding of ray tracing and its practical applications in computer graphics. We also hope to have a working software package for generating high-quality images.

## Technical Details

- Ray Tracing Type: Path Tracing
- Uses Antialiasing
- Positionable Camera
- Different Material Types:
  - Diffuse Materials
  - Metal
  - Dielectrics
- Different Geometric Shapes:
  - Spheres
  - Triangles
- Textures
- Parallel Processing Optimizations

## Platform Details

We still did not choose a platform. We have several candidates:

- C/C++ (Plain)
- C/C++ with [OpenCL](#)
- C/C++ with [CUDA](#)
- C/C++ with [ArrayFire](#)
- C/C++ with [HIP](#)
- C/C++ with [Kokkos](#)

We will be experimenting with these different candidates before choosing one of them. We also might implement the algorithm in multiple platforms to compare performance.