# RAYTRACER BY BRANDON

The ray tracer is one of the most difficult projects I have ever worked on, due to the complexity it represented for me. The difficulty resided in 2 factors, the understanding of what I wanted to do step by step, how it would be to establish a camera, lights, objects, which would be represented in an image, and as a second factor, the methods using formulas, which would also have to understand.

With the help of Professor Jafet Rodriguez, this is how I was able to start developing. He introduced me to the subject and gave us a push, and I started with the point lights where he already managed to make the animals have better lighting, in addition to being the first type of light that he could move in the scene and it was not directional.
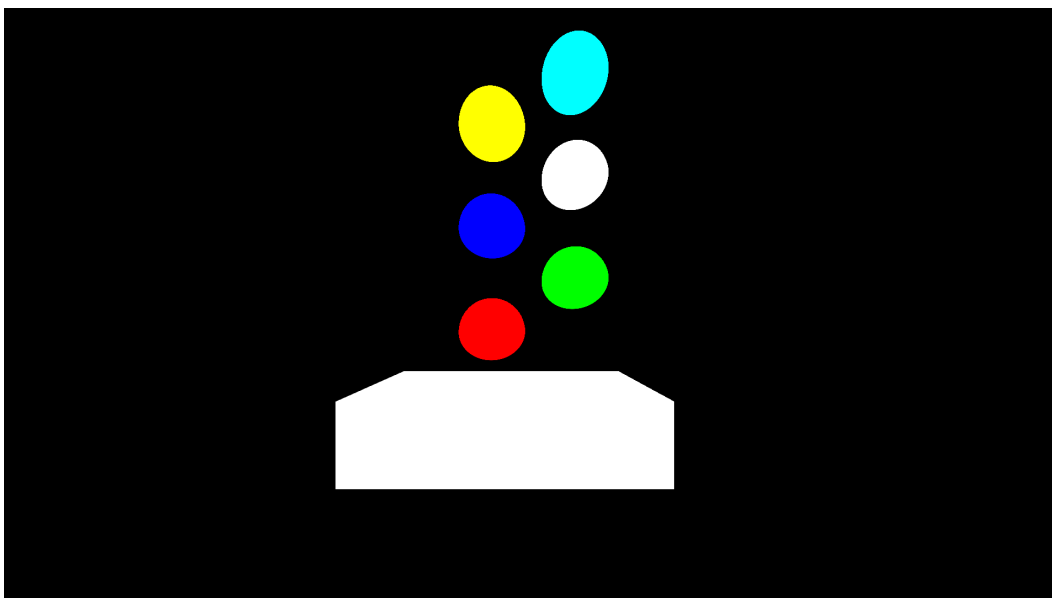
After having the lights that could illuminate me from different angles and having them between objects and in general a better mobility with light, I started working with the shadows, and to achieve the type of shadow that in this case are hard shadows, it was achieved making the point of intersection of the object, another ray will be launched in the direction of all the lights, and in case it collided with an object, it would mean that the ray did not reach the light and therefore the pixel remains dark assimilating a shade.
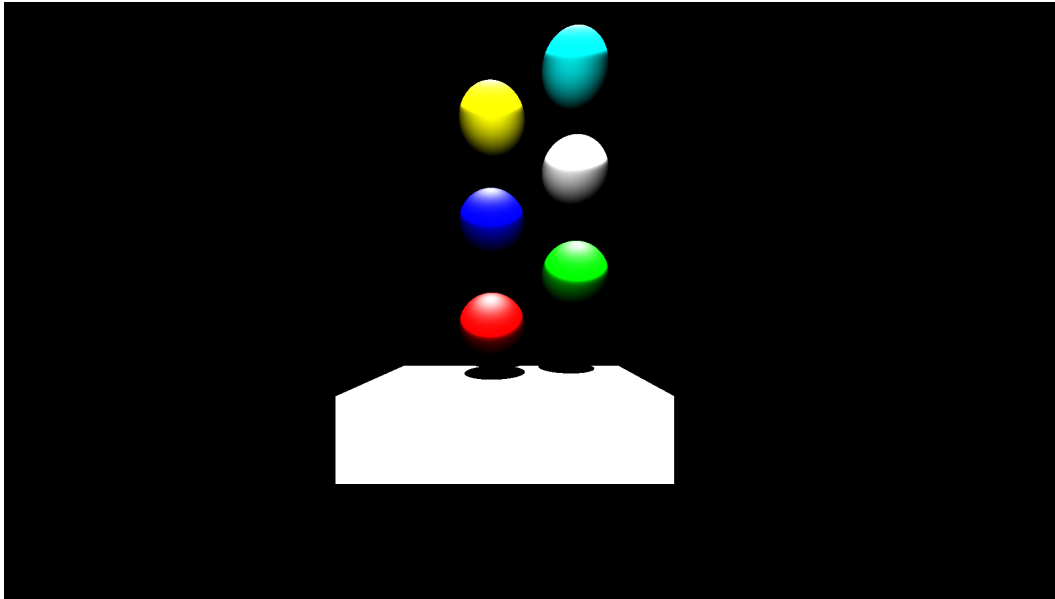
Next to the shadows, I implemented the bling phong method, in which using the ambient color of the object, which would be its color without direct reflecting lights and its diffuse color, up to now it is what we already had, we were going to add a layer color of the specular, which is derived from the dot product of the Half vector and the object's normal, this is exponentiated to the object's shininess value, which determines how shiny the object is.
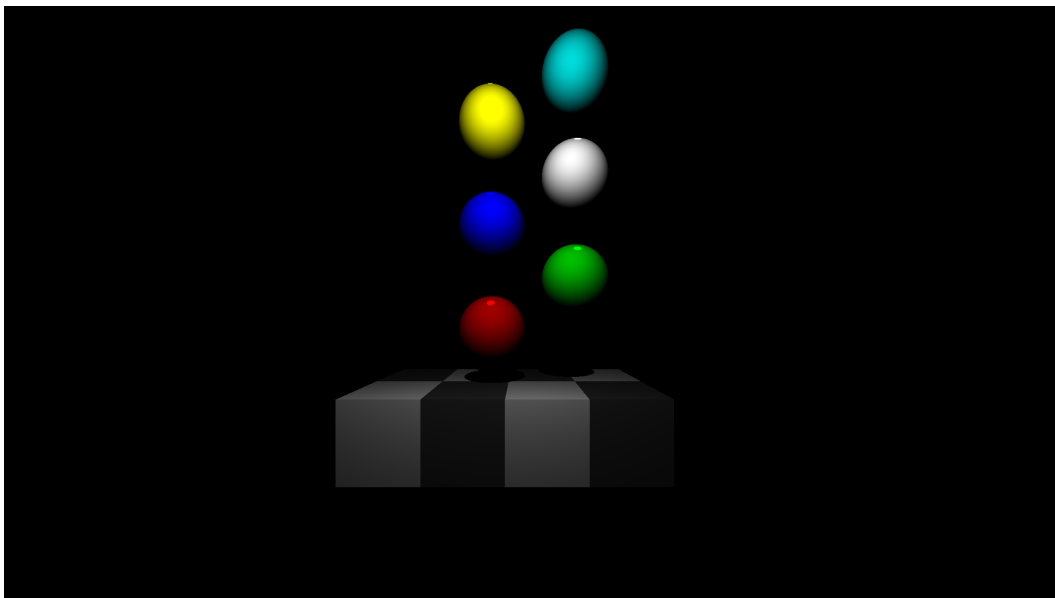
Throwing a beam in the opposite direction of the direction of the camera at the object, it checks if it collides with an object and paints the pixel of that color, assimilating a reflection of the closest object in case there was none, it stays the same color that of the similar object, and in case the

percentage of reflection of the object is checked to know how much is painted on the original smell of the object, in the following example the sphere, from below has a greater reflection and the last one It has a low reflection percentage, so the reflection is less visible.
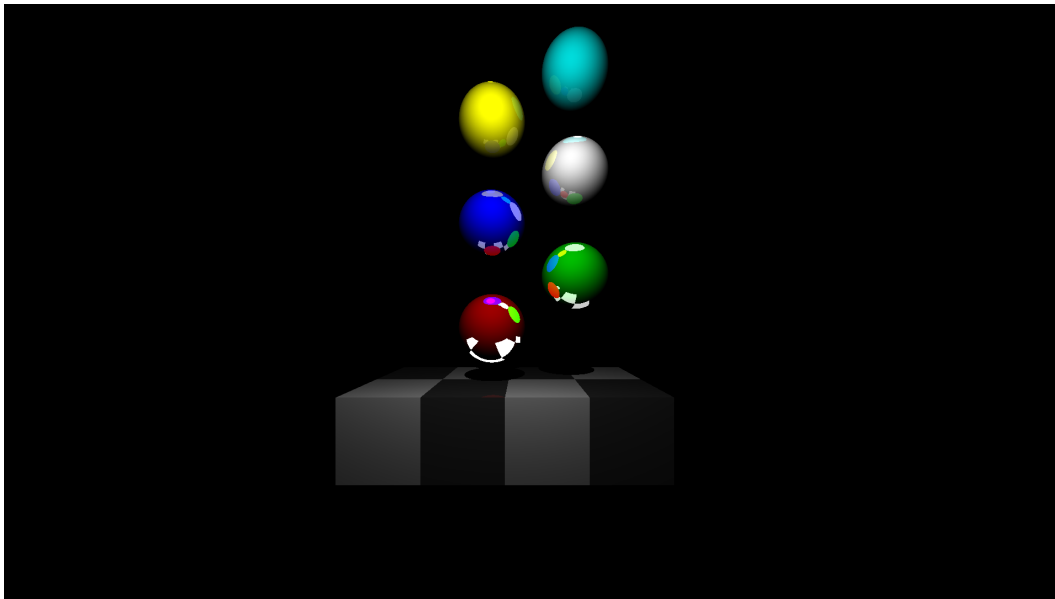
For refraction, the implemented method was to launch a projected ray with a changed angle of direction through calculations in which a normal was taken with a slight change angulation and this is only applied if the object is of the transparent type and the object is transparent. object can preserve or not Whether or not it reflects how the image looks like it is a sphere that is not of any color it only reflects the colors of the others around it

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