

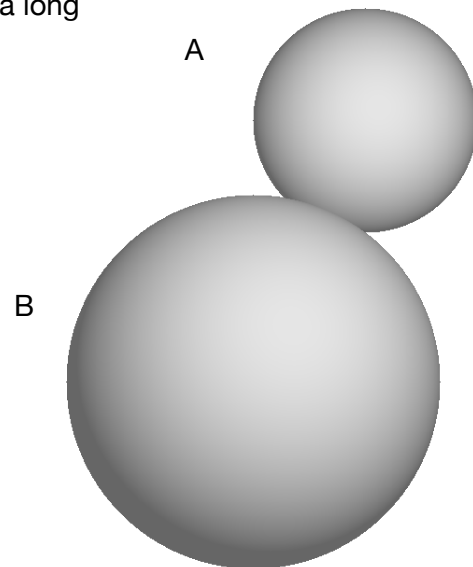
### General Implementation:

I defined a base class CObject and several virtual functions under it. [get\_shading, get\_normal, is\_hit]. They need to be implemented by derived classes of Sphere, Triangle and Surface. A mesh reader class and light class are also defined.

How to run: ``cd <assignment>/build; cmake ..; make -j && ./Assignment1_bin`

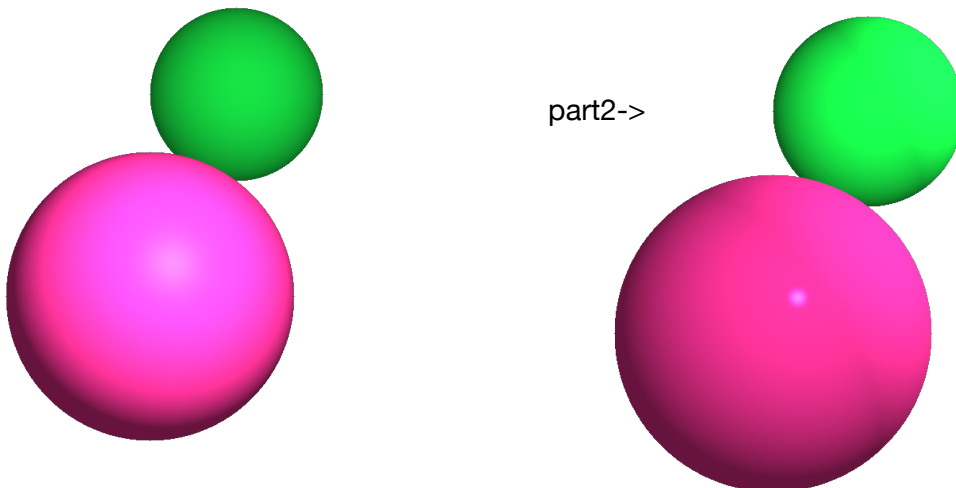
### Part1:

I generated two spheres. Lambertian shading is used here. A is behind, B is in front. They are of similar size but has a long distance between them.



### Part2:

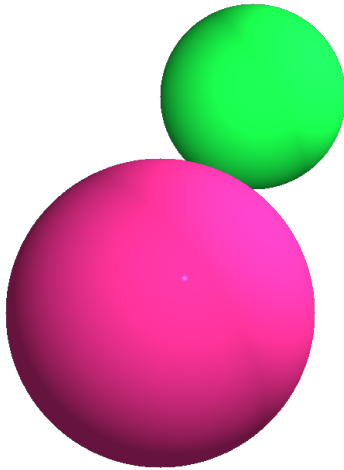
I changed the colors of the spheres. I also added spectral shading to the front sphere. On the second picture on the right, in order to see the effect and the difference of spectral shading, I turn down the lambertian strength and play with spectral power coefficient. As spectral power going up, the luminance contributed by spectral shading gets dimmer. A second light source is added on the right side of the screen.



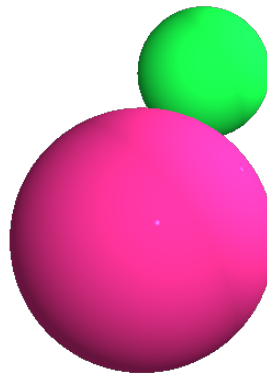
### Part3:

In part three, we play with perspective projection. From the orthogonal projection in which ray shoots out in parallel, here we have the perspective projection. Rays start from the same origin and go in different directions. It is more close to the perspective of human eyes. The green sphere was blocked a little more by red sphere. The distance between ray origin and the object increases.

orthogonal projection

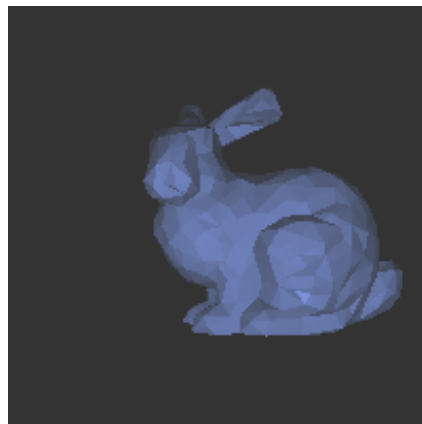


perspective projection



### Part4:

The OFF file is quite difficult in the perspective of finding a suitable camera angle. Two meshes have completely different scale.



Part 5 & 6:

two spheres with different materials. The red one has only Lambertian, The blue one has both spectral and Lambertian, spectral power is high so it's mostly suppressed. It's part of a series of picture where the light source position and camera position is moved.

A second light source is generated at the same position as the first one. It's moving in the negative direction of Y axis. As result, you can see a new spectral reflection generated on the surface of blue sphere.

I also created a surface which has both spectral and lambertian shading. Shadow was added as well. You can see shadow on both spheres and surface.

