CS184 Project 3-2

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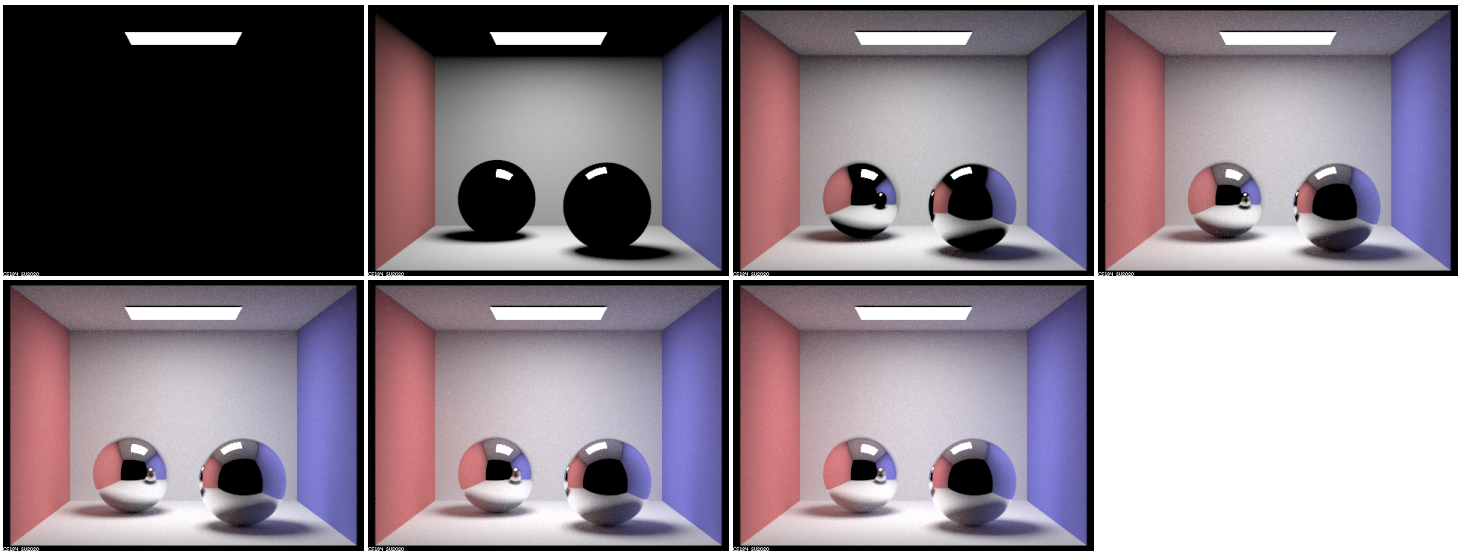
Chosen Parts: Parts 1 and 4

https://cal-cs184-student.github.io/sp22-project-webpages-kaitlynlee/proj3-2/index.html

Part 1

In Part 1, we implemented code to support reflection and refraction for glassy materials. Below is the renders for depths 0, 1, 2, 3, 4, 5, 100.



At depth 0, we just only see the light source which is to be expected. At depth 1, we see the first bounce which bounces on the walls of the room. The spheres only show black with a bit of white from the light source since there is only a single bounce of reflection/refraction from the light source. At depth 2, the spheres now show reflection/refraction from the walls and surrounding objects since it has the second bounce. The reflection in the sphere contains the other sphere which is dark still until depth 3. The differences between depths 4, 5, and 100 are hard to notice by the naked eye due to their very small contributions, but generally the pictures are slightly brighter due to the extra bounces added.

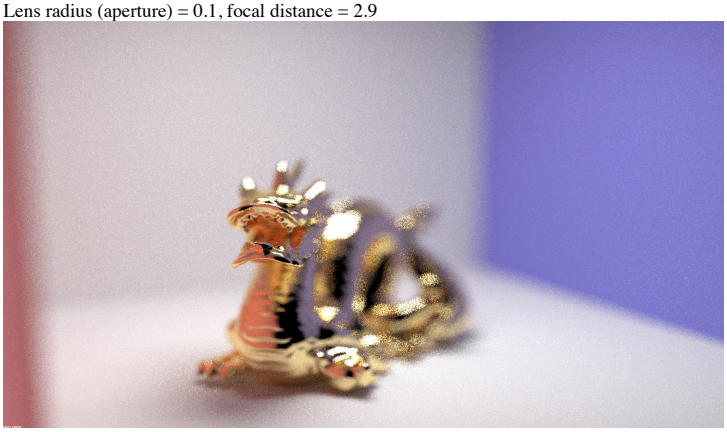
Part 4

In this part of the project, we implemented a thin lens model for our camera. With the pinhole camera model, we assumed that light was only entering the camera through a tiny hole, so everything is in focus. However, most cameras (and the human eye) use the thin lens model. With the thin lens model, objects are in focus only if they're within a plane that is some distance from the lens (this distance depends on the focal length of the lens). This means that there will be a range of depth in the scene that will be in focus, and anything outside that range will be out of focus (if it is too close or too far back).

Focus Stack

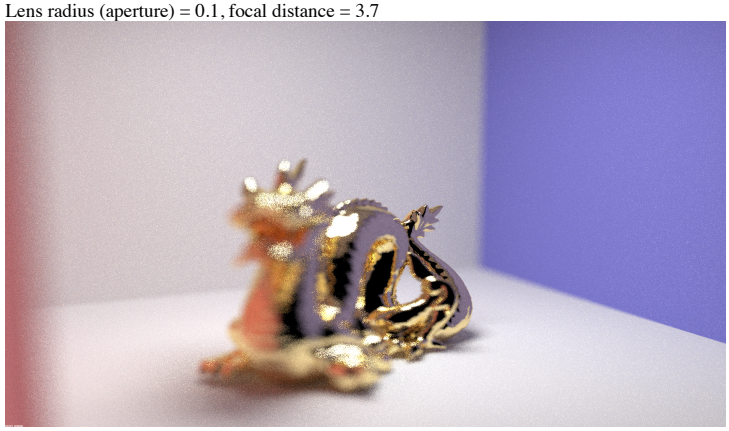
Here we can see the affects of varying the focal distance while keeping the aperature constant.

Lens radius (aperture) = 0.1, focal distance = 2.9

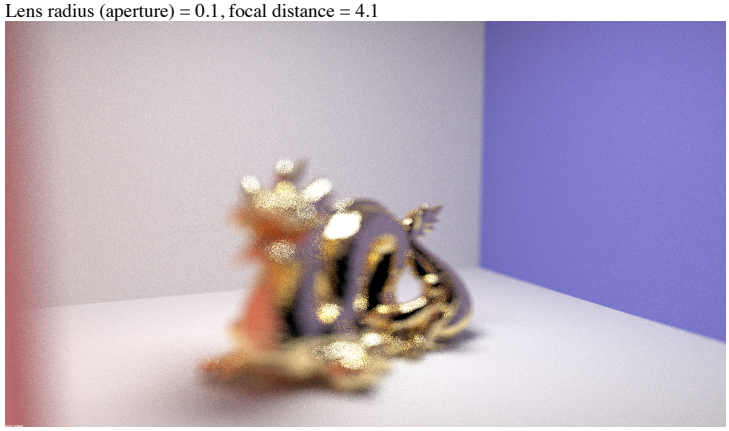


Lens radius (aperture) = 0.1, focal distance = 3.3

Lens radius (aperture) = 0.1, focal distance = 3.7



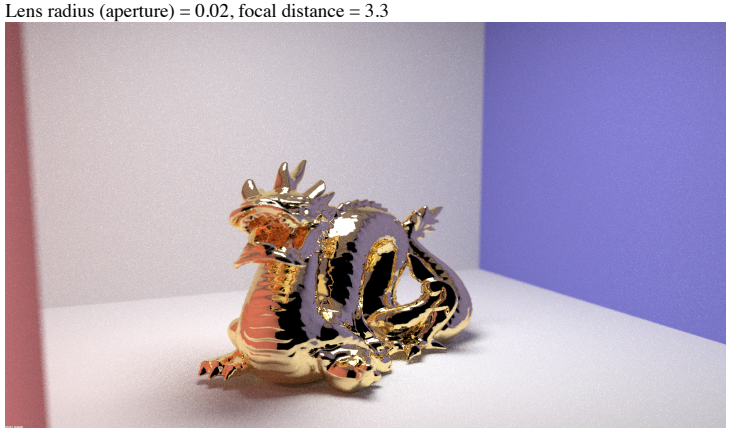
Lens radius (aperture) = 0.1, focal distance = 4.1



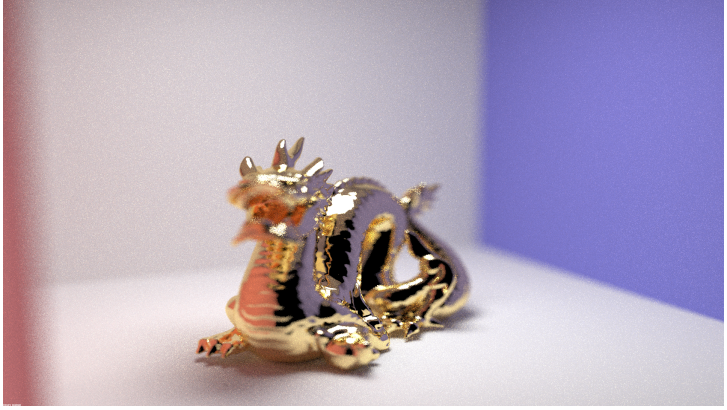
Aperture Stack

Here we can see the affects of varying the aperature while keeping the rendering focused on the center of the dragon. As lens radius increases, the area in focus decreases.

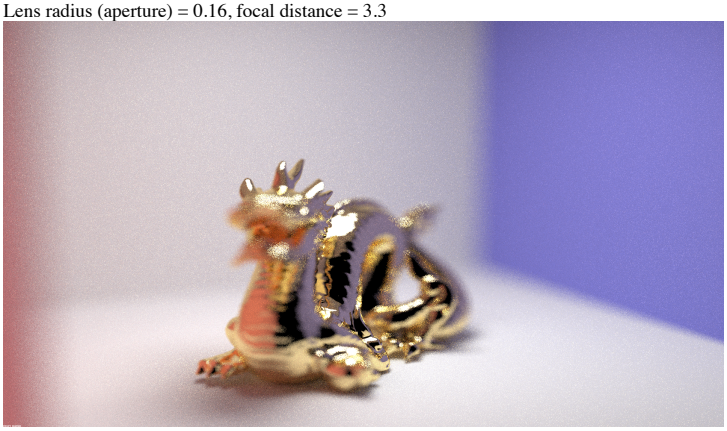
Lens radius (aperture) = 0.02, focal distance = 3.3



Lens radius (aperture) = 0.09, focal distance = 3.3



Lens radius (aperture) = 0.16, focal distance = 3.3



Lens radius (aperture) = 0.23, focal distance = 3.3