

Project 5 README

NO HELP. Online source indicated in the source code. I worked at Vangogh lab, but on gl server.(at shin7@gl.umbc.edu)

Program Usage Example>

```
<program> <nff file name> <ppm result file name> <# of threads> <supersampling option> <haze option>  
./raytracer.out balls1.nff balls1.ppm 4 -supersampling:no -haze:no
```

I apologize but you must specify supersampling and haze option even if you don't want to use it. You still must specify -supersampling:no -haze:no.

It has reflect and refraction. The thing is that it uses blinn phong to specify colors. It considers shadows even when reflected and refracted.

It supports other than reflection and refraction. :

1. Shadow Lights
 1. It creates 8 light rays to render natural shadow.
 2. Usage > In NFF file, you specify radius of light using l option.
 1. For example > l <x> <y> <z> <color.R> <color.G> <color.B> <radius>
 2. For example > l 0.9 1.3 1.8 1.0 1.0 1.0 0.8 ==> This specifies Light Radius = 0.8
 2. Super sampling
 1. It uses gaussian reconstruction from http://en.wikipedia.org/wiki/Normal_distribution.
 1. It picks a random position in the pixel and apply gaussian interpolation to derive a natural color.
 2. The random position is based on pseudo-poisson distribution. (Also, jitter at the same time.)
 3. Haze
 1. I solved the linear equation of how to attenuate light depending on distance.
 1. $A * distance^2 + B * distance + C = T$
 2. $Color = Color / T$
 2. In conclusion, I found A, B, C to properly attenuate light to display haze effect.
- Sometimes I have to be aware of stack overflow. I use static allocation(Not Malloc() or new). That means that when the pool gets too big, it might overflow the stack assigned in the machine. In that case, it might cause a segmentation fault. It should not happen if you do not use shadow rays / supersampling turned on at the same time for big objects such as balls3_transparent.nff

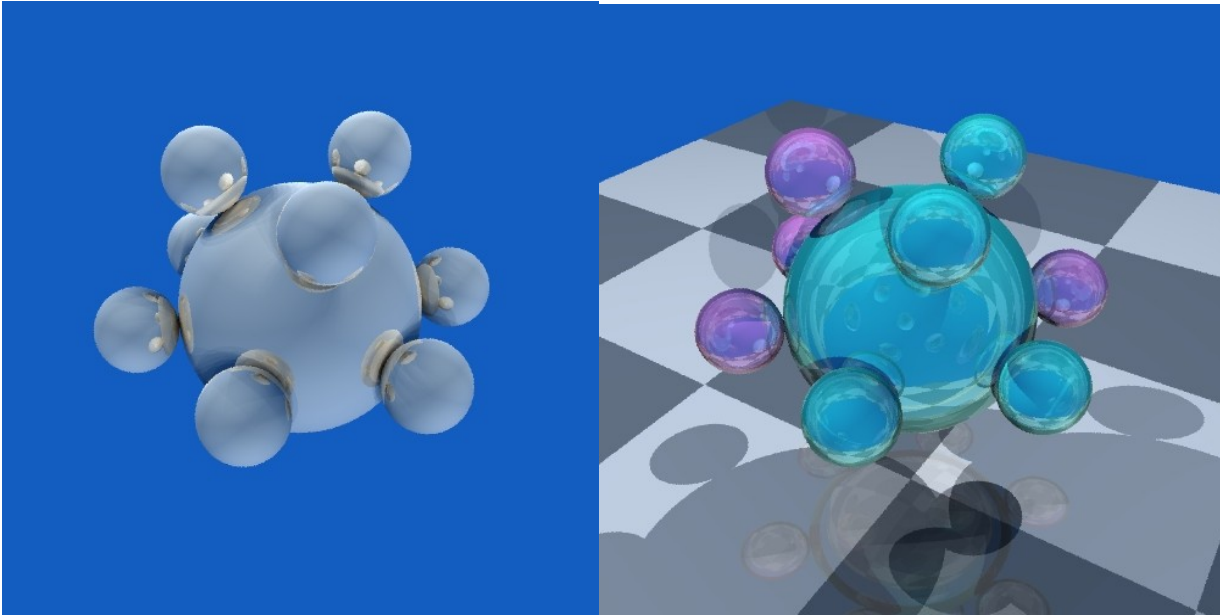
Example 1> Balls1.nff <Supersampling-on> <Shadow Lights-on>

Example 2> Balls1_transparent.nff <Supersampling-on> <Shadow Lights-off>

<I turned on the refraction transmission as well.>

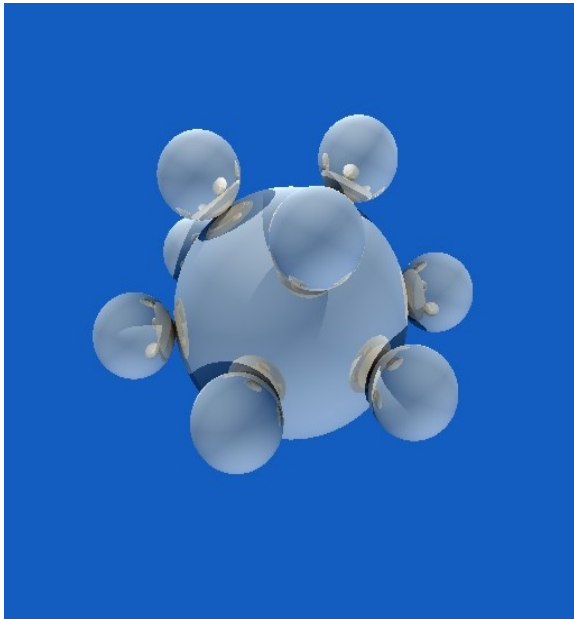
I did not change anything except the tile plane, and the color of 4 spheres.

Sorry that it takes too long to do shadow light. I turned it off for transparent object.



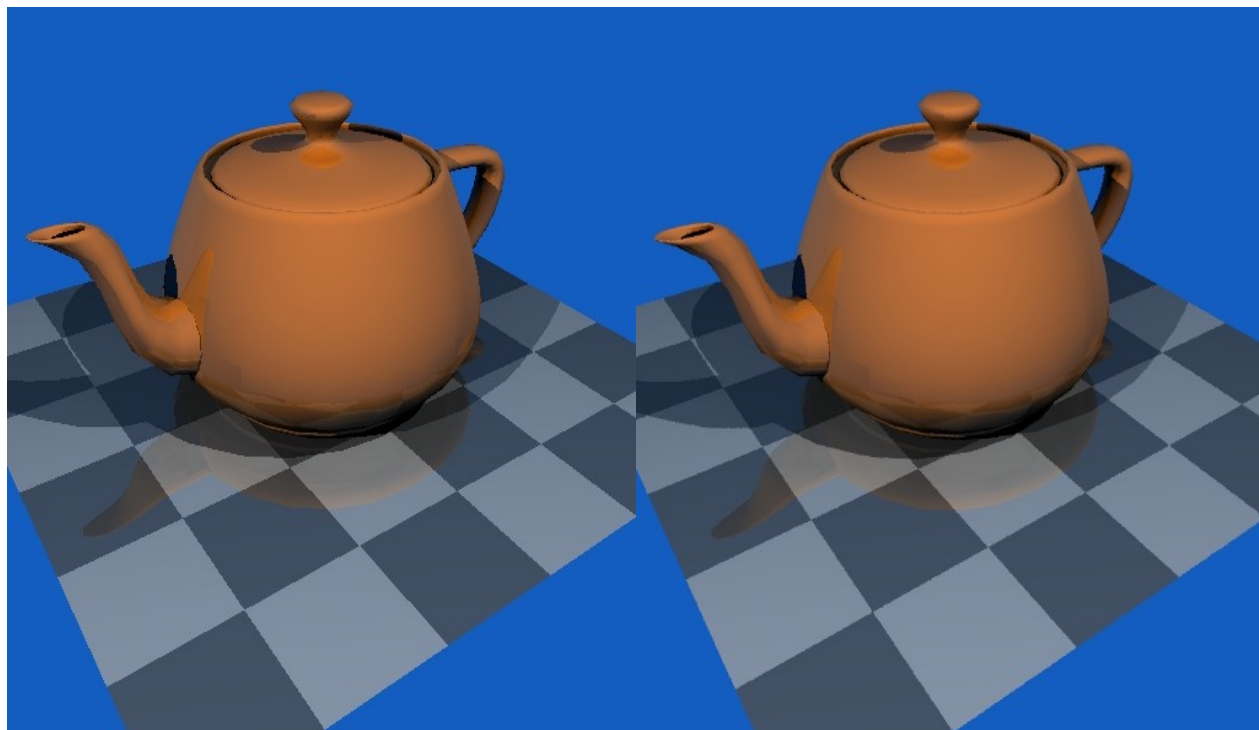
The same balls1.nff but without shadow lights <Shadow Lights - OFF>

You can see many obvious shadow this time.

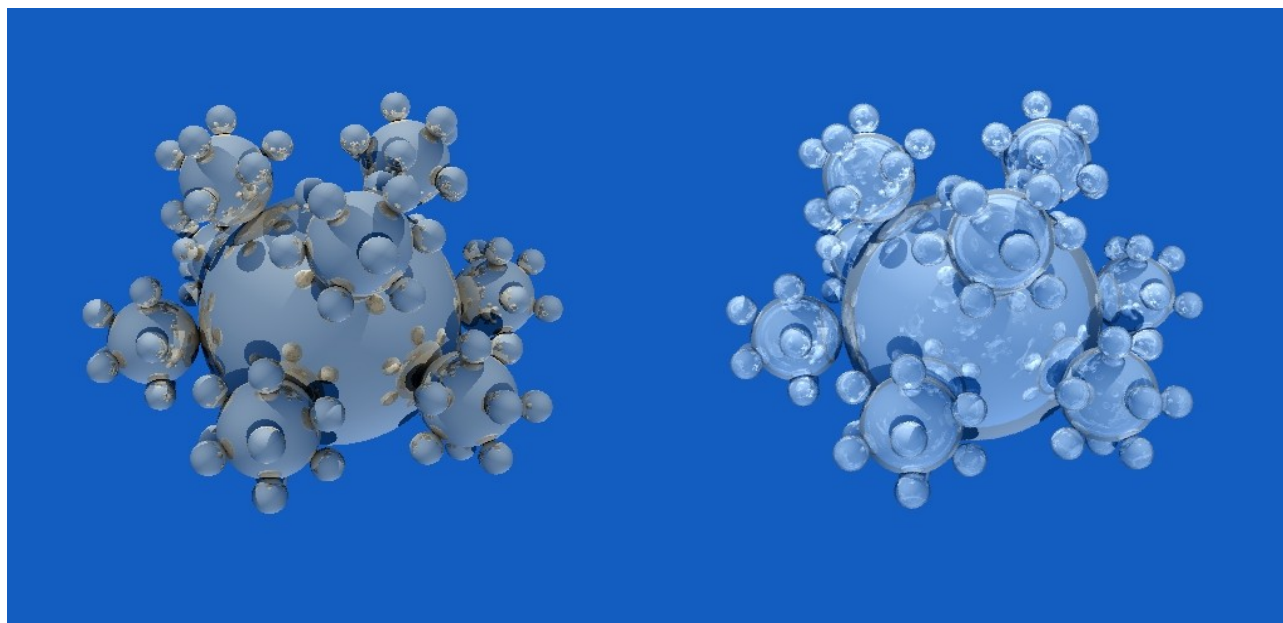


Example 1> Teapot.nff <super-sampling-off> <Shadow lights-off>

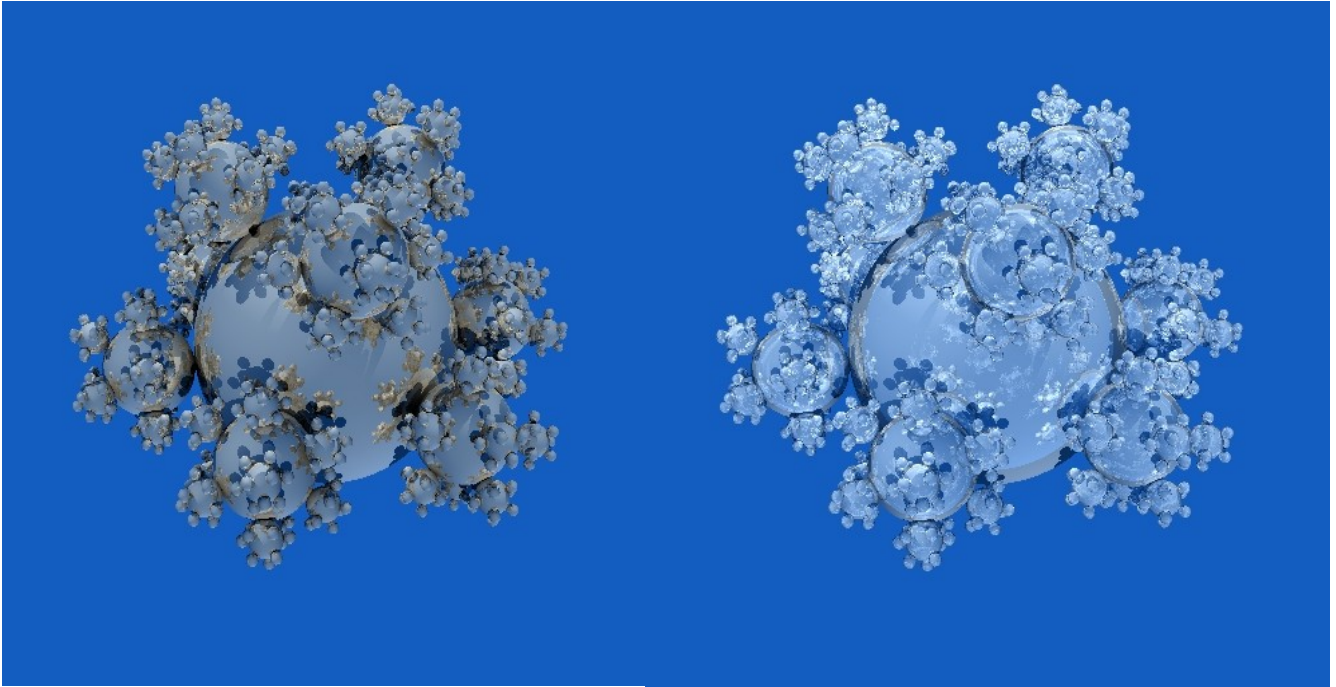
Example 2> Teapot.nff <SUPER SAMPLING ON> <shadow lights- off>



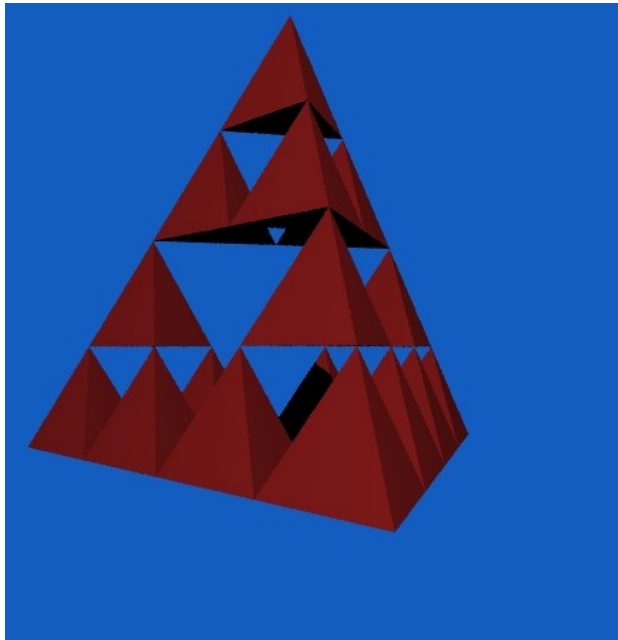
<balls2.nff> <Balls2_transparent.nff>



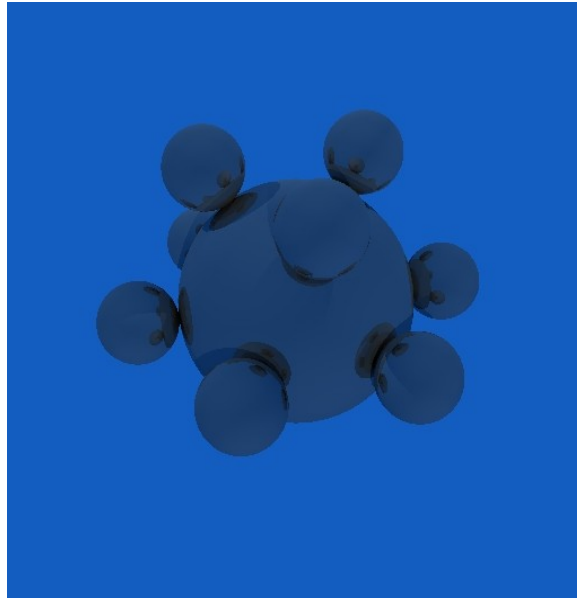
<balls3.nff> / <balls3_transparent.nff>



<Tetra3>



<Balls1> Haze turned on



<Teapot2.nff> Shadow lights turned ON. Everything else off.
Notice the natural shadow.

