

10 Shadow Volumes

References

F. Crow, “Shadow Algorithms for Computer Graphics.” SIGGRAPH 1977.

- <http://dx.doi.org/10.1145/965141.563901>

M. McGuire, “Efficient Shadow Volume Rendering.” *GPU Gems*, 2004.

- http://http.developer.nvidia.com/GPUGems/gpugems_ch09.html

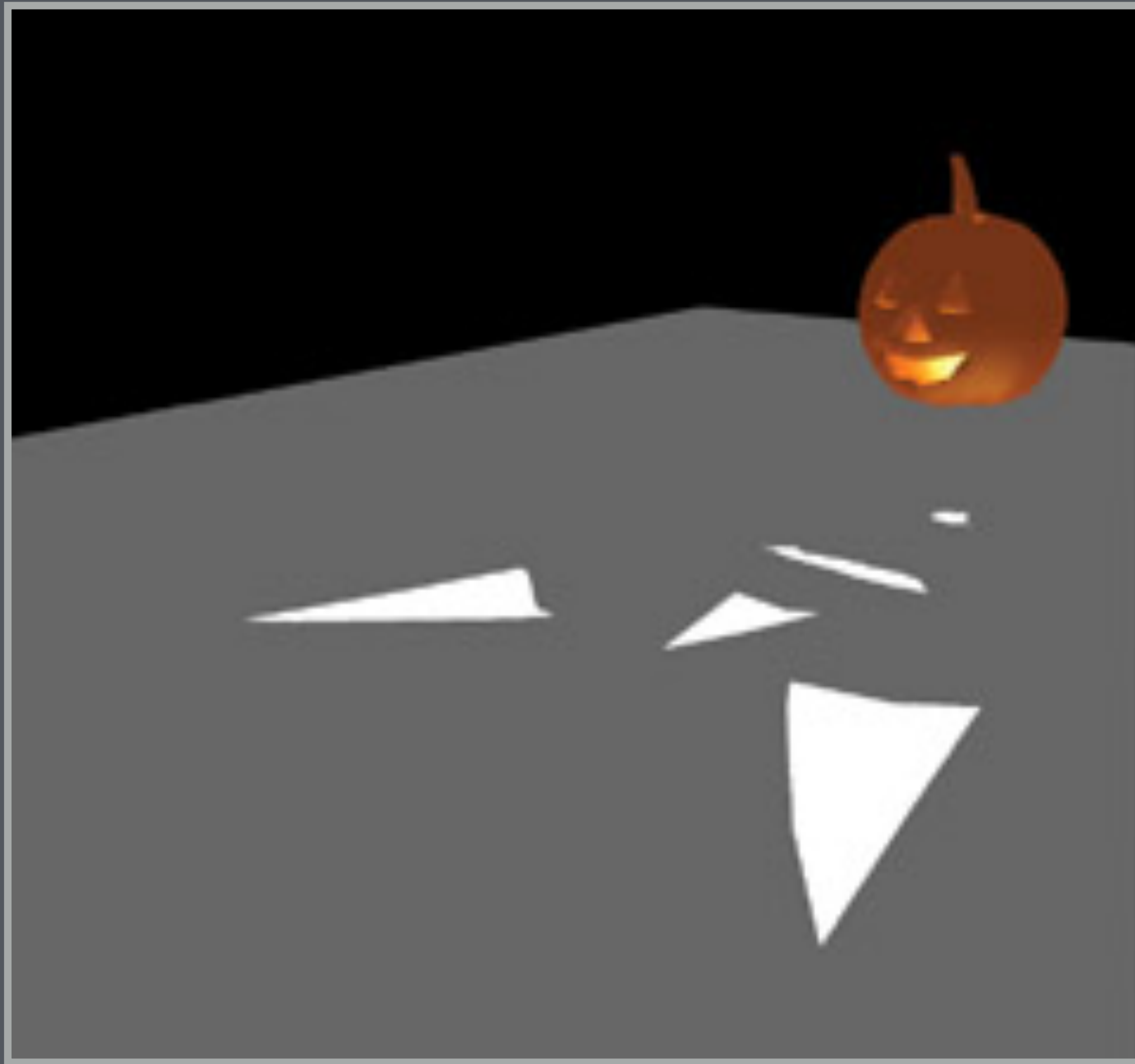
M. Stich et al., “Efficient and Robust Shadow Volumes Using Hierarchical Occlusion Culling and Geometry Shaders.” *GPU Gems 3*, 2008.

- http://http.developer.nvidia.com/GPUGems3/gpugems3_ch11.html

E. Lengyel, “Projection Matrix Tricks.” Presentation at GDC 2007.

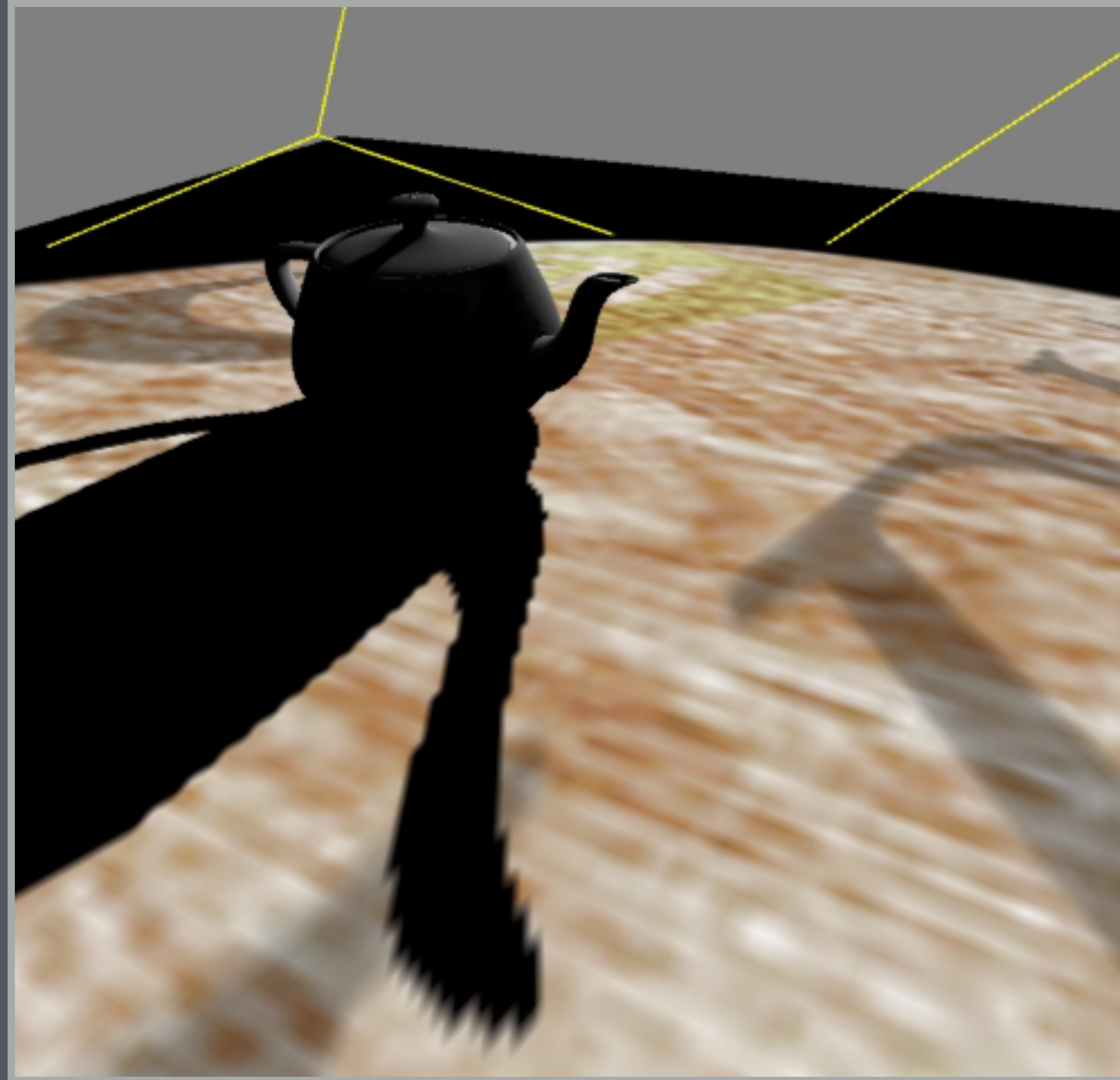
- http://www.terathon.com/gdc07_lengyel.pdf

Problem cases for shadow maps



Morgan McGuire, GPU Gems

Problem cases for shadow maps



Mark Kilgard, NVIDIA Inc.

Shadow Volumes

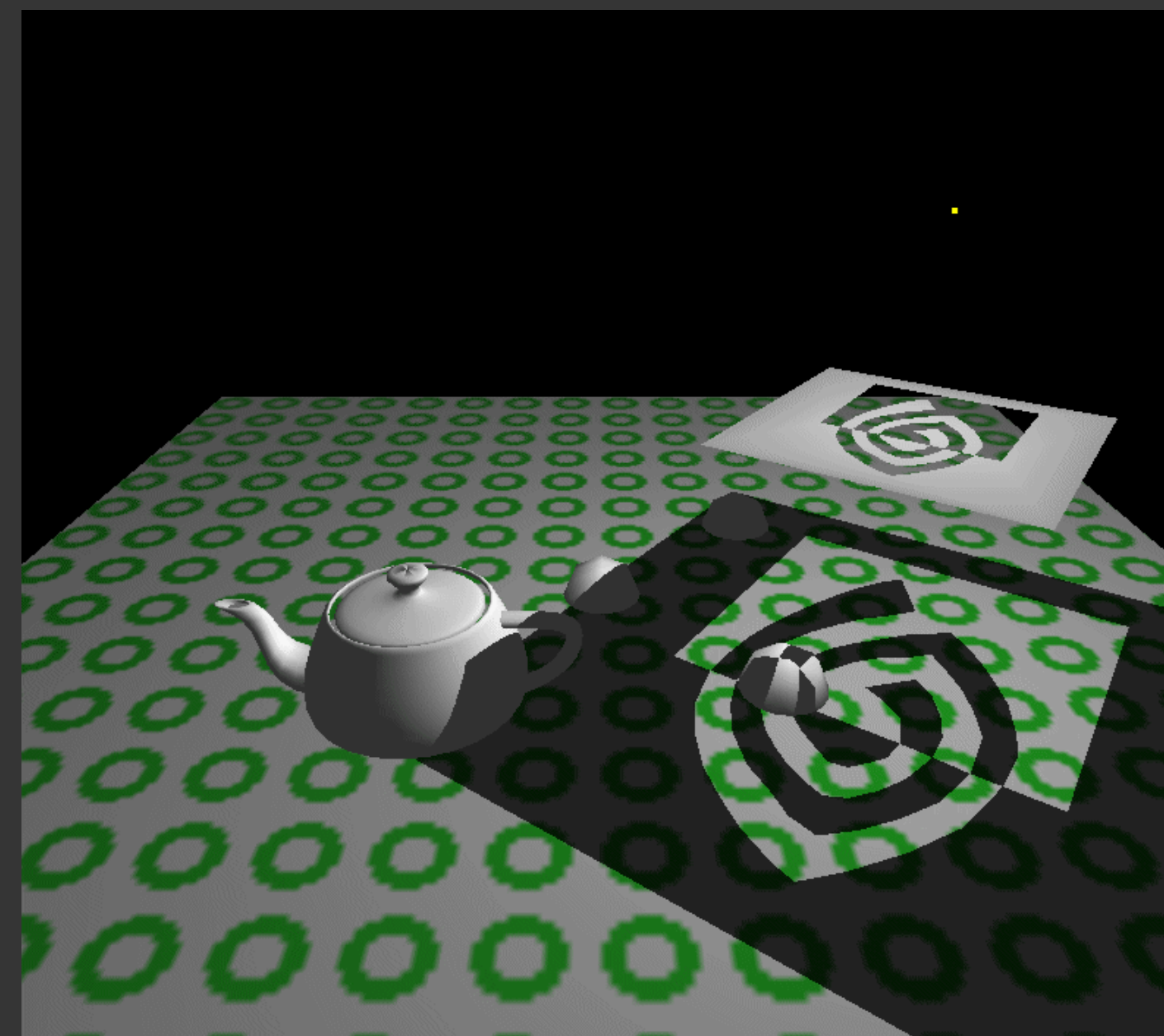
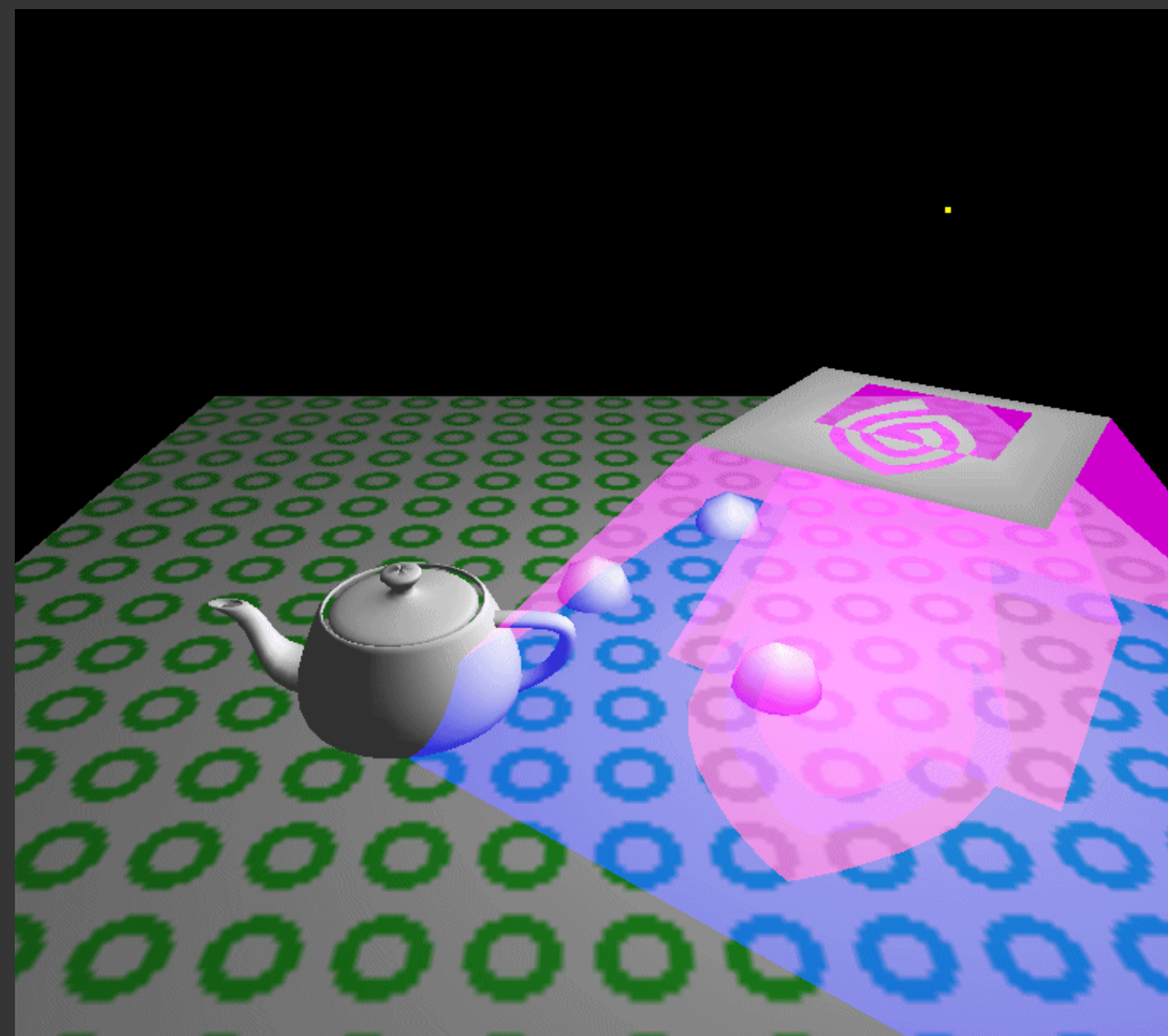
- Crow 1977
- Accurate shadows



Image courtesy of BioWare [Neverwinter Nights](#)

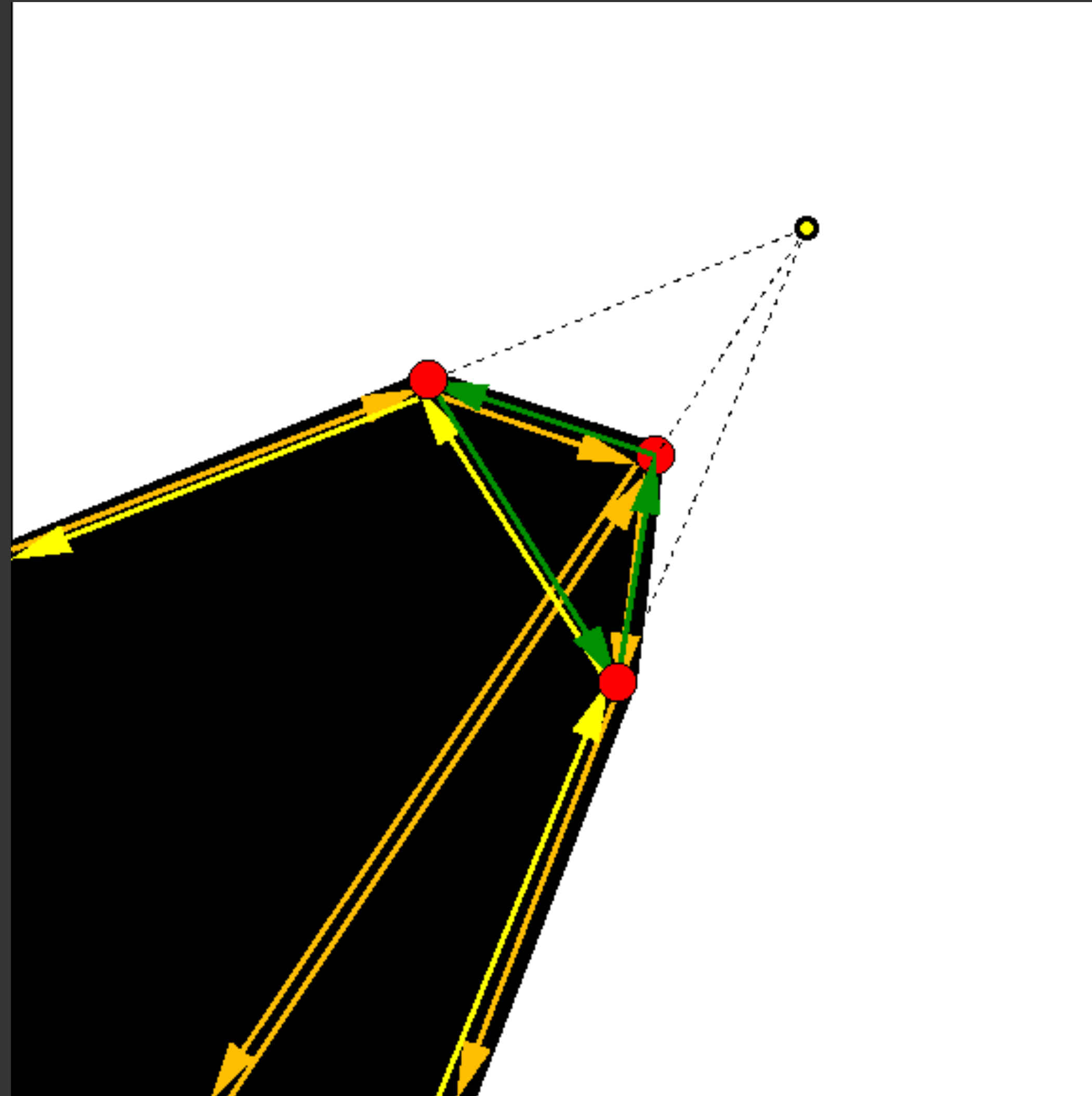
Shadow Volumes

- Accurate shadows
- Clever counting method using stencil buffer
- Can cast shadows onto curved surfaces



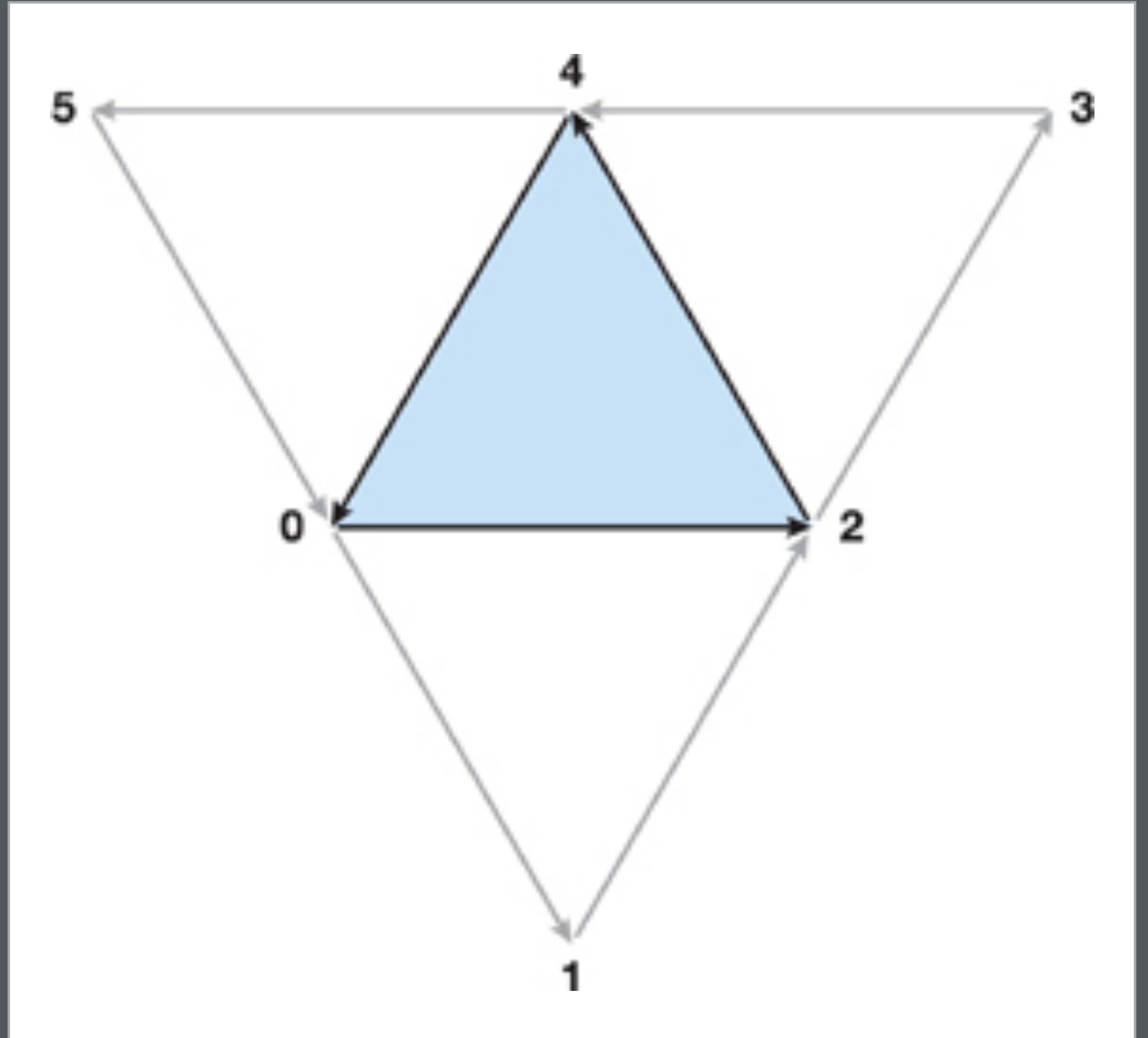
Mark Kilgard, NVIDIA Inc.

Primitive Volume



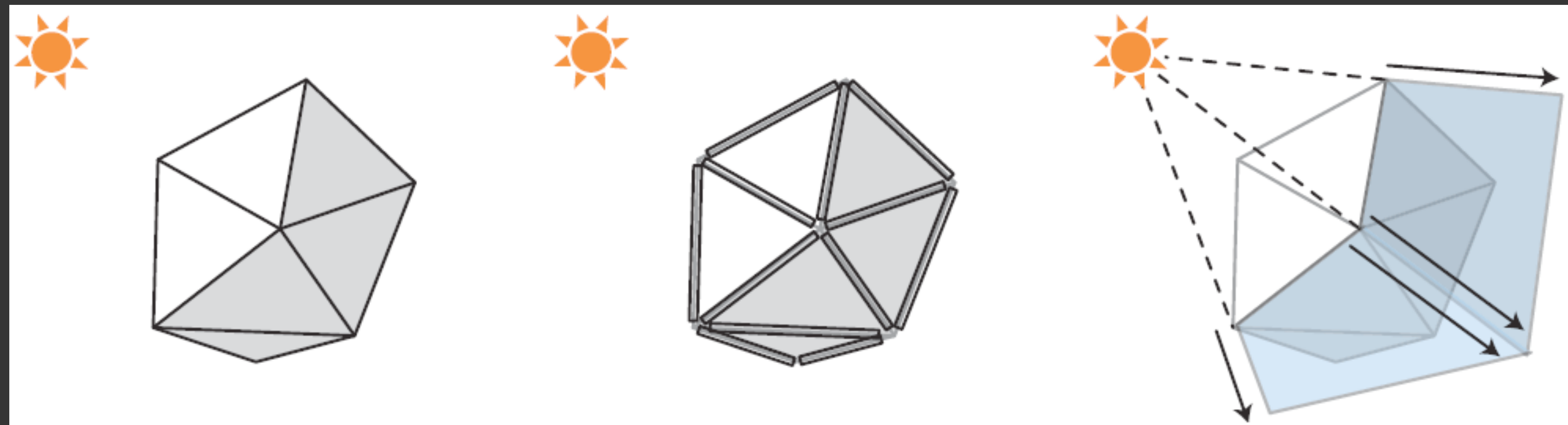
Geometry shader input

Primitive type:
GL_TRIANGLES_ADJACENCY
or GL_TRIANGLE_STRIP_ADJACENCY

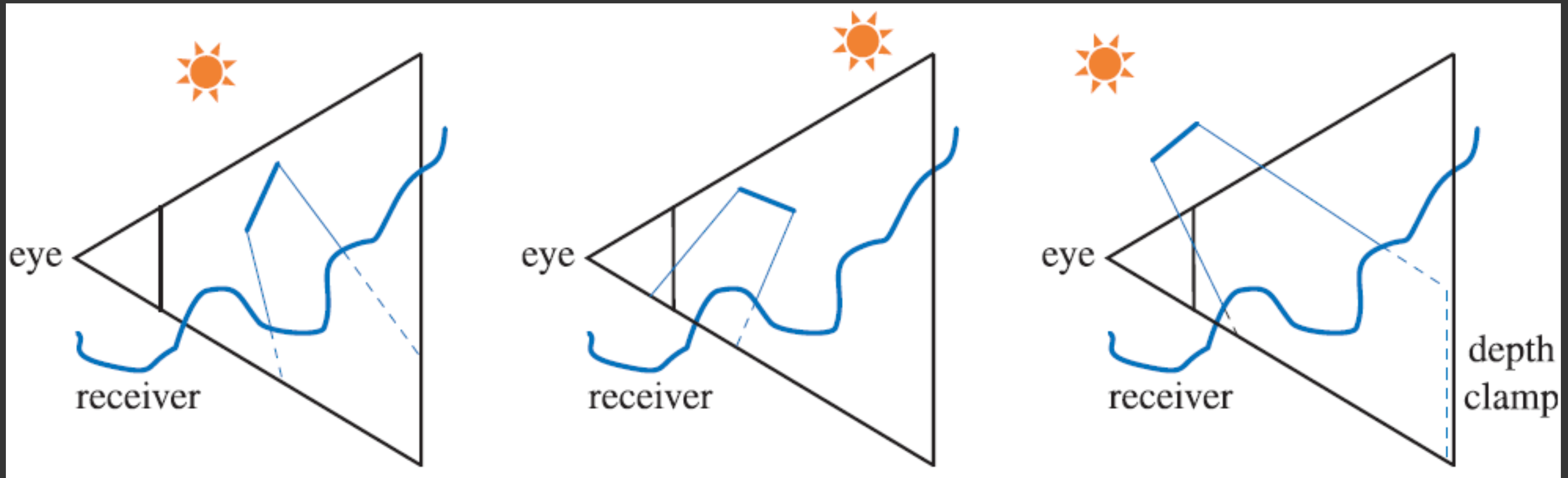


Creating Volumes

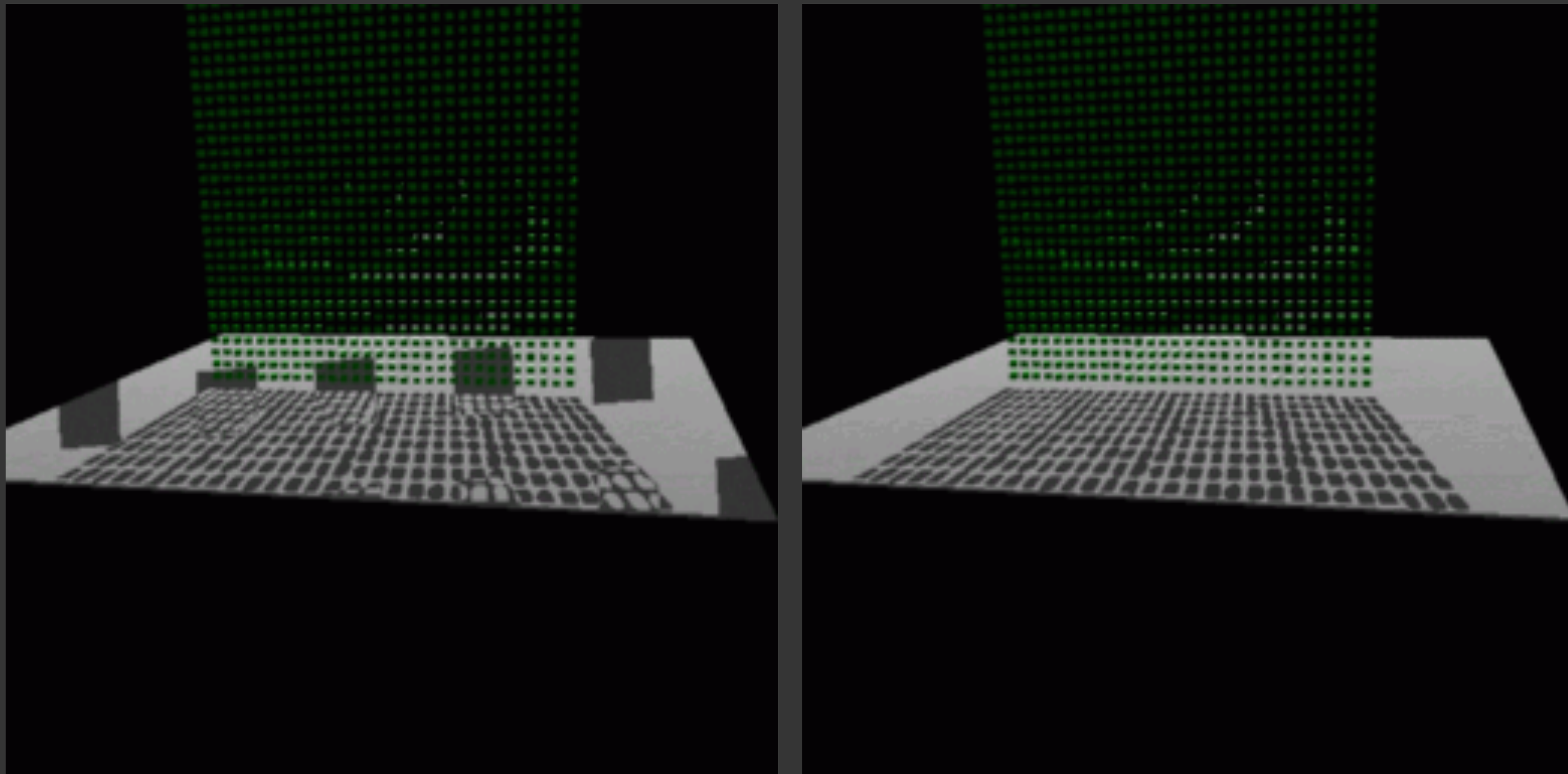
- Geometry shader can generate volumes on fly
- Send edges as degenerate triangle
- Check if silhouette wrt light



Clip plane issues



Near Plane Clip Issues



- Near plane clip discards part of shadow volume, messes up count

