Shadows

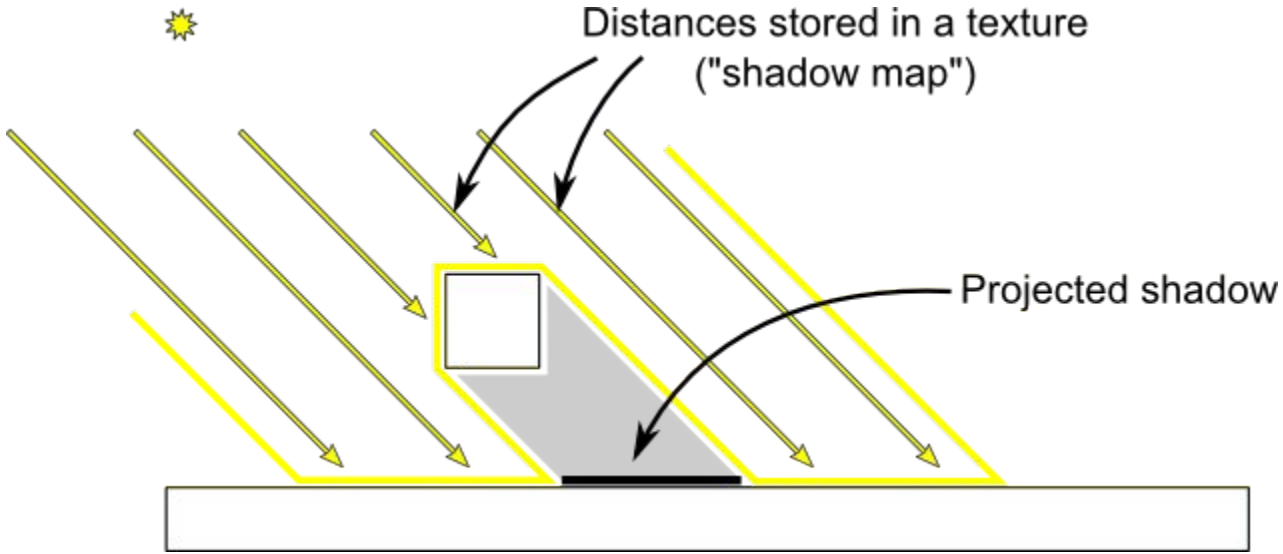
Video Game Graphics AD-011

Shadow algorithms

- Shadow mapping
- Volume shadows
- Ray-traced shadows
- Faked shadows

Shadow mapping

Scene is rendered from point of view of the light source into offscreen buffer. Later this buffer is used as a texture to render objects which receive shadows.



Shadow mapping pros & cons

Pros

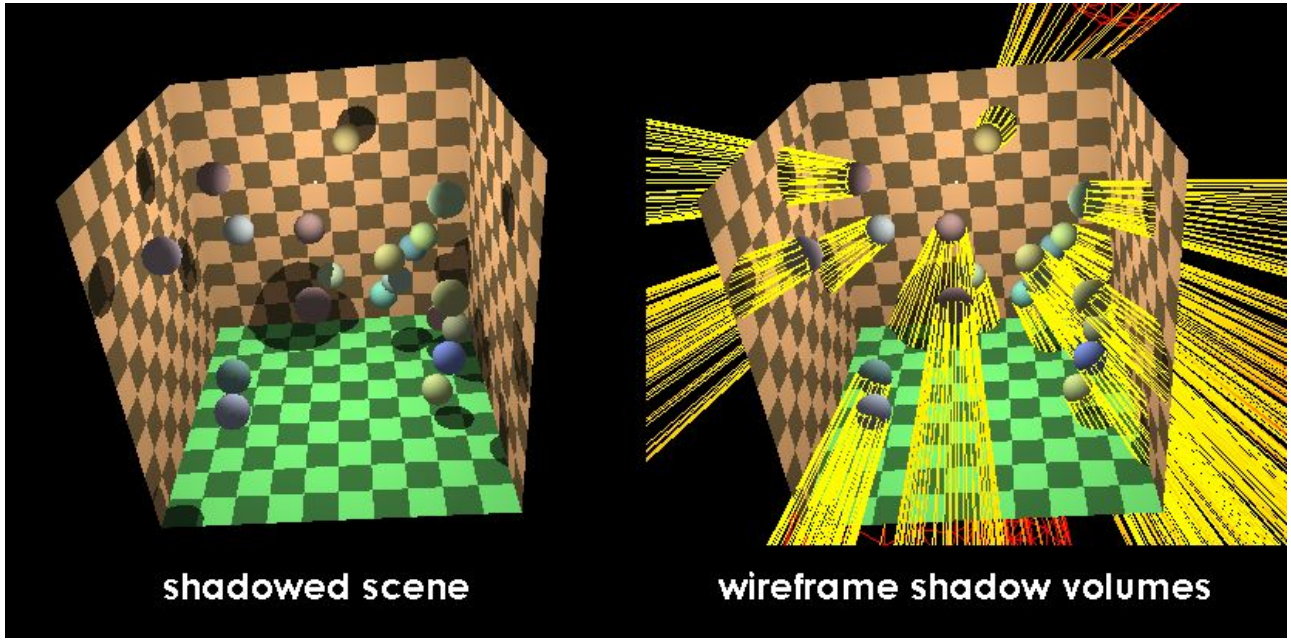
- Widely supported. All modern game engines use it as a default shadow algorithm
- Relatively easy to implement

Cons

- Requires scene to be rendered multiple times
- Shadows are sharp
- Aliasing and shadow continuity artifacts

Volume shadows

Additional geometry created, describing the 3D shape of the region occluded from a light source. A shadow volume divides the virtual world in two: areas that are in shadow and areas that are not.



Volume shadows pros & cons

Pros

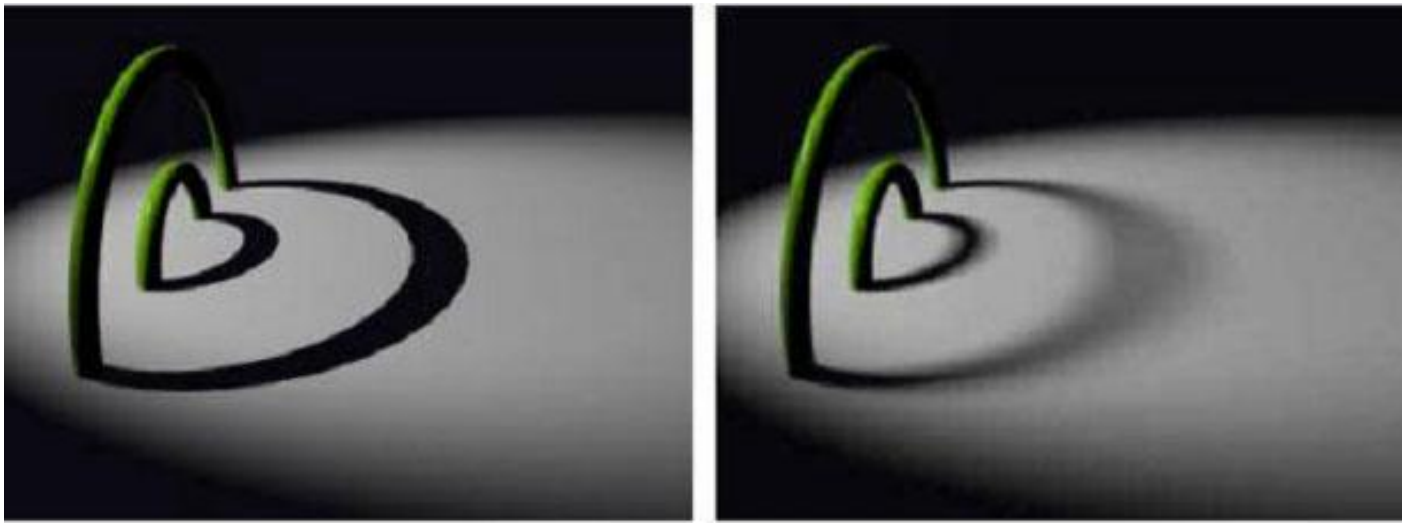
- Less artifacts as shadows are vector shapes

Cons

- Shadows are sharp
- Usually slower than shadow mapping as geometry creation requires CPU time
- Can’t be used to cast shadows from textures with holes, as shadows are vector shapes

Ray-traced shadows

Physically based light ray tracing. Often used for creating offline shadow maps in static scenes. Gives accurate results with minimal artifacts but deadly slow.



Ray-traced shadows pros & cons

Pros

- Physically correct
- Soft shadows

Cons

- Not suitable for real-time rendering using modern hardware

Faked shadows

There are numerous ways to fake shadows. One popular technique is to create additional plane geometry under shadow casting objects.