

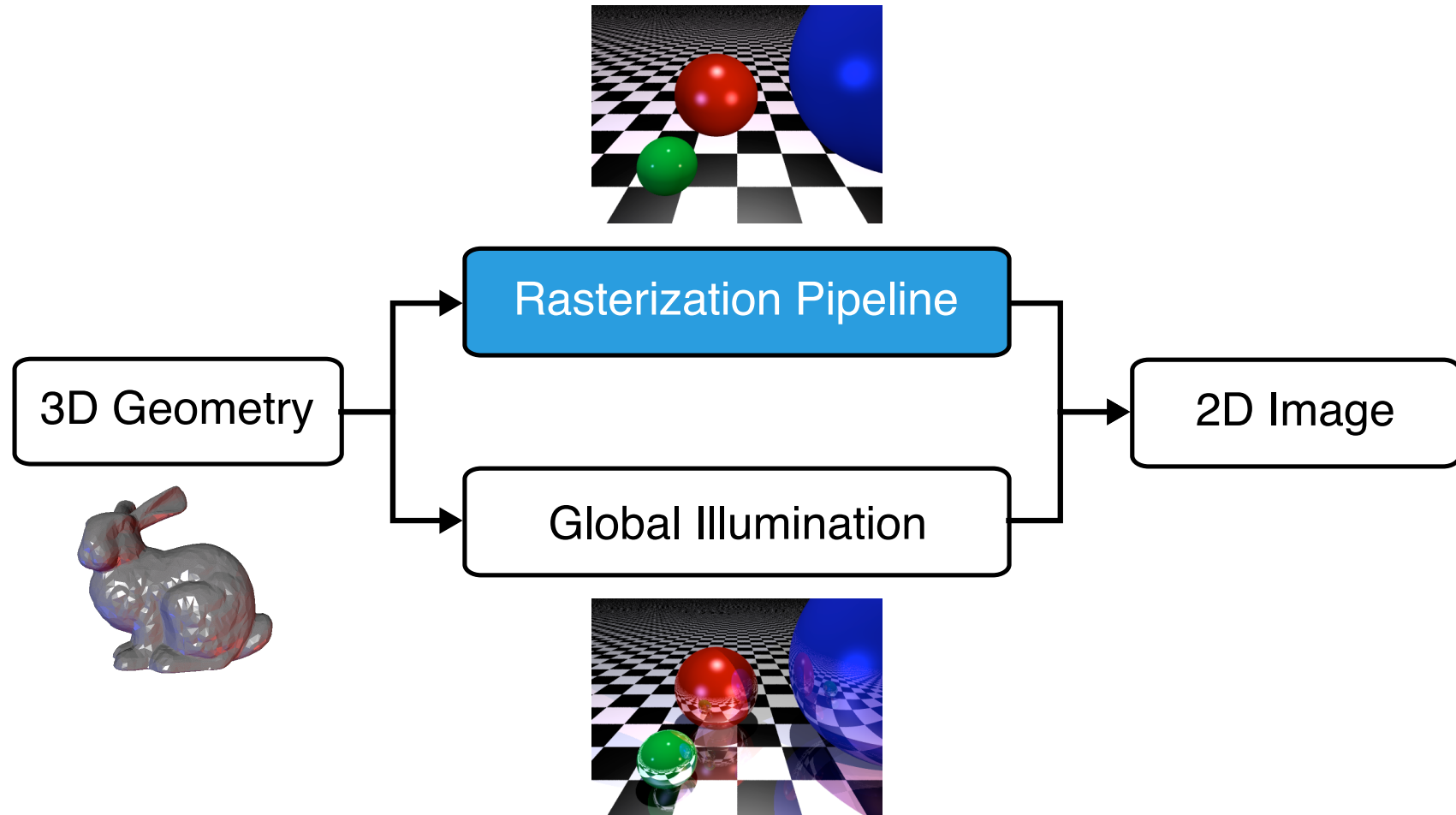
Computer Graphics

GPU Rendering Pipeline - Overview

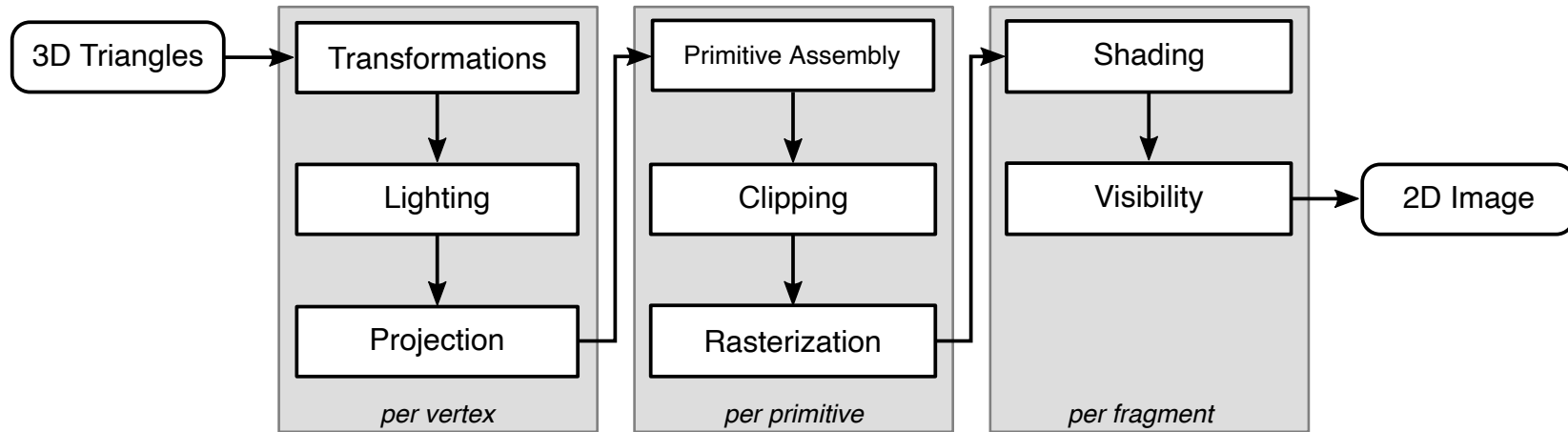
Mark Pauly

Geometric Computing Laboratory

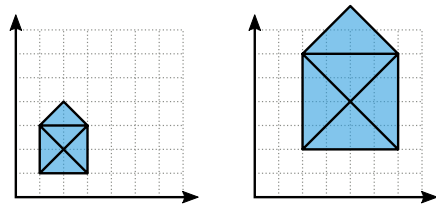
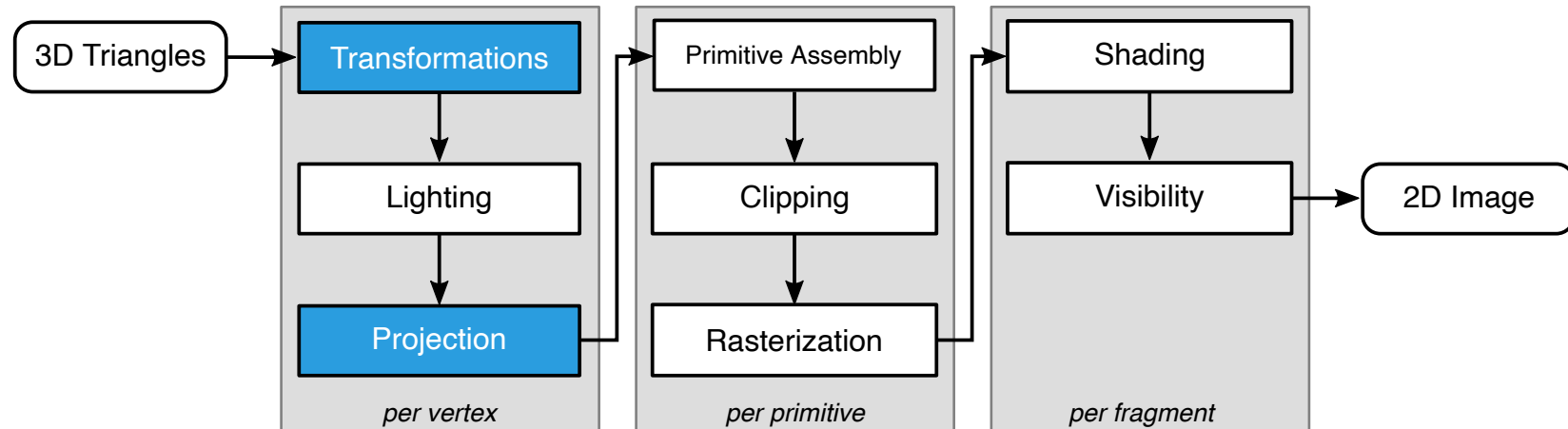
Rasterization Pipeline



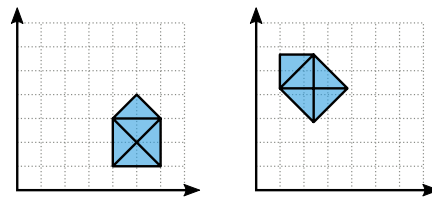
GPU Rasterization Pipeline



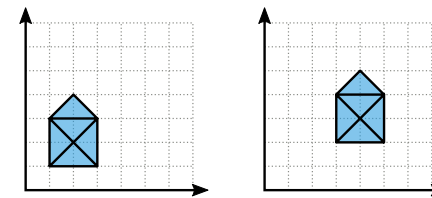
Transformations & Projections



scaling

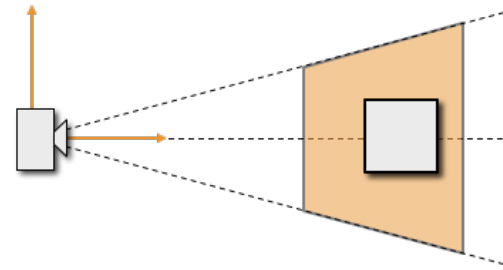
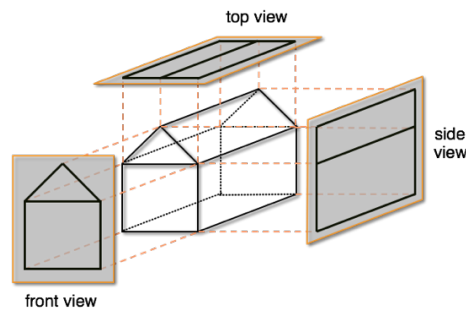
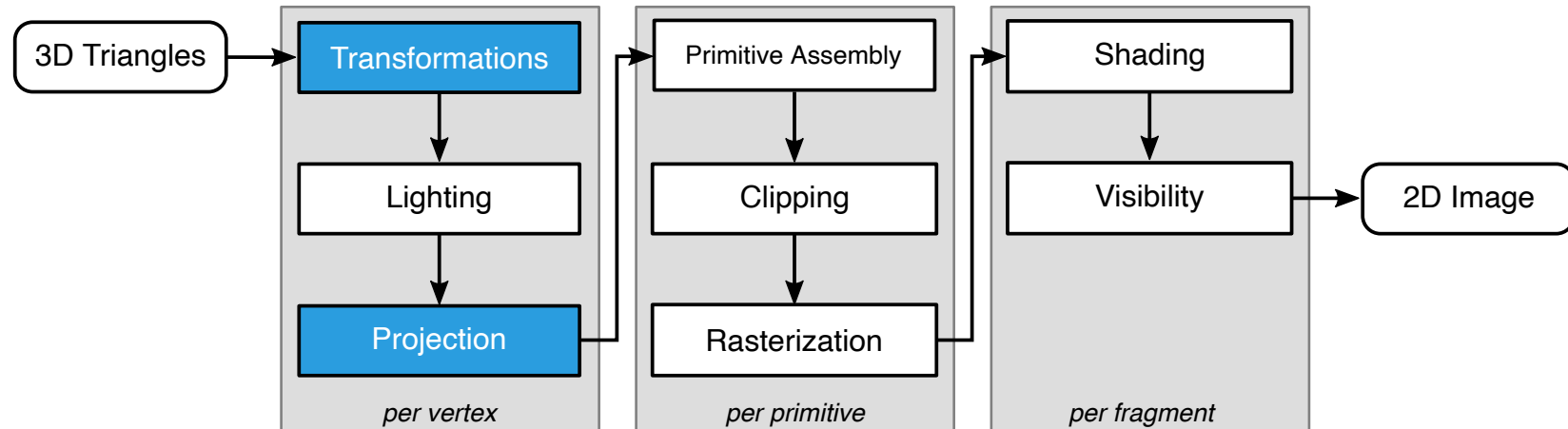


rotation

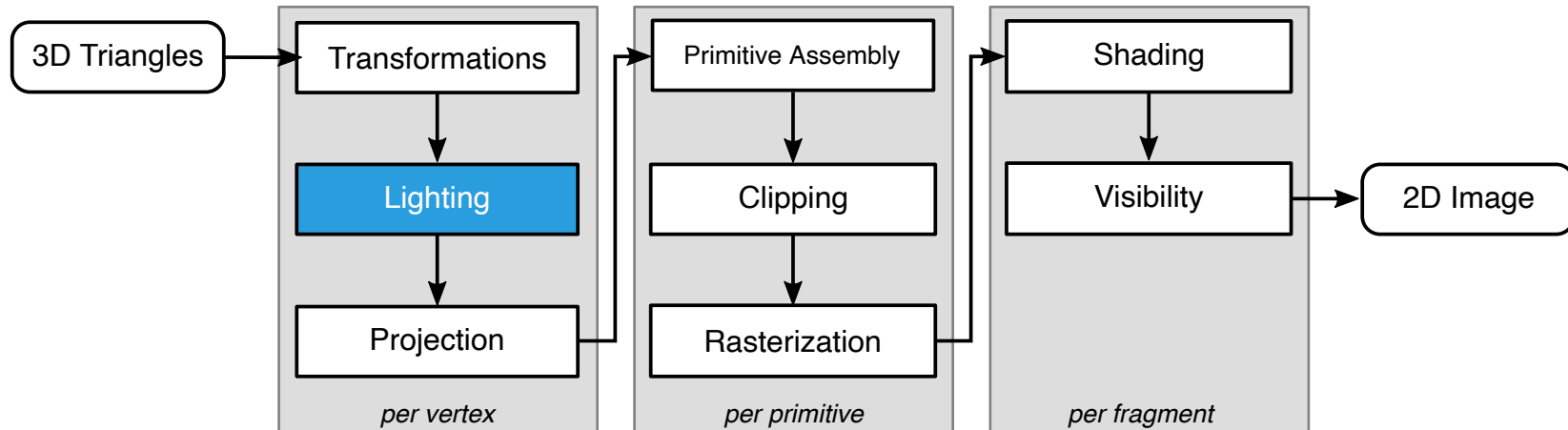


translation

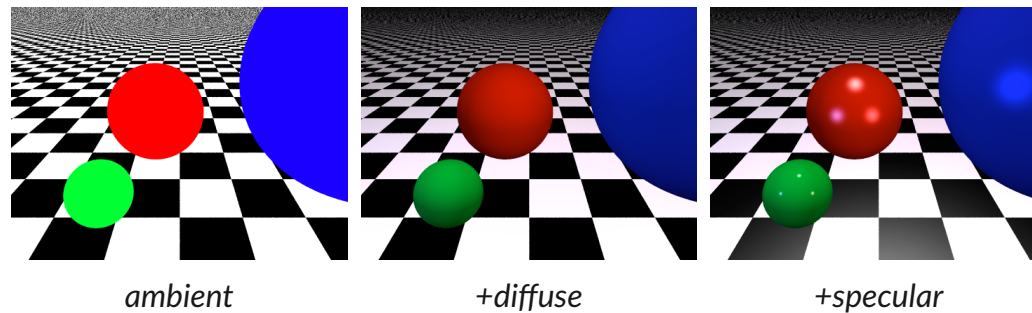
Transformations & Projections



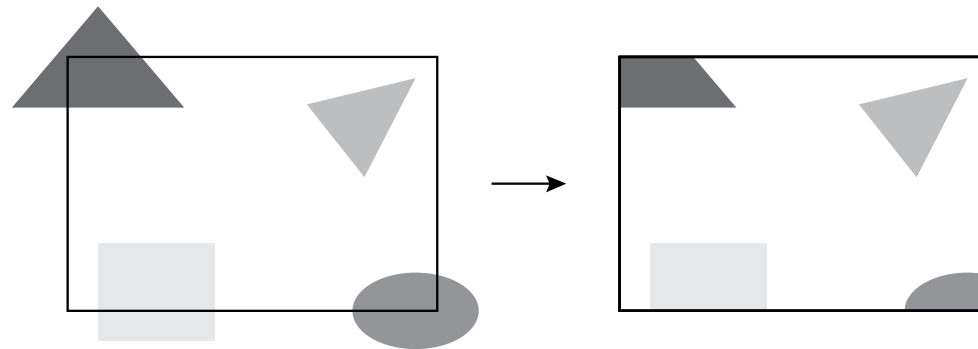
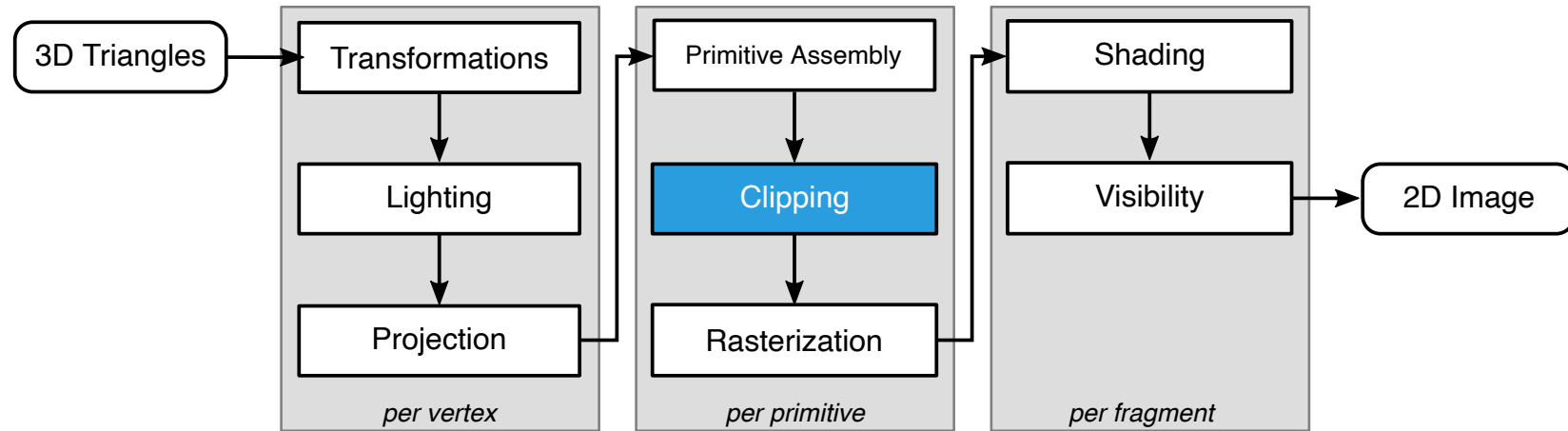
Lighting



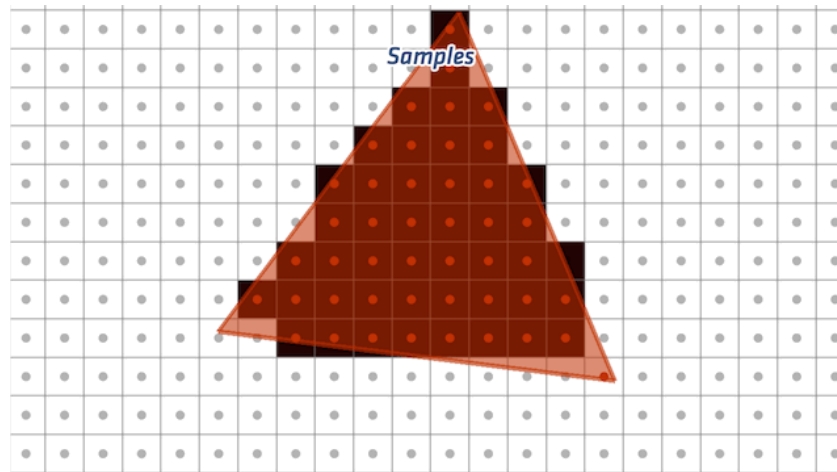
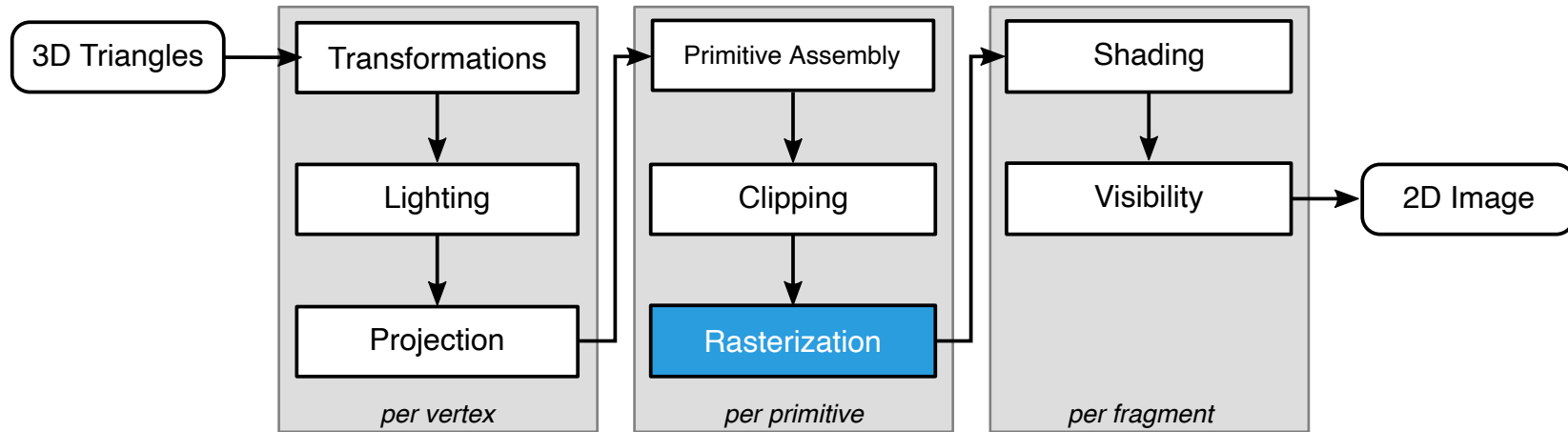
Phong Lighting Model



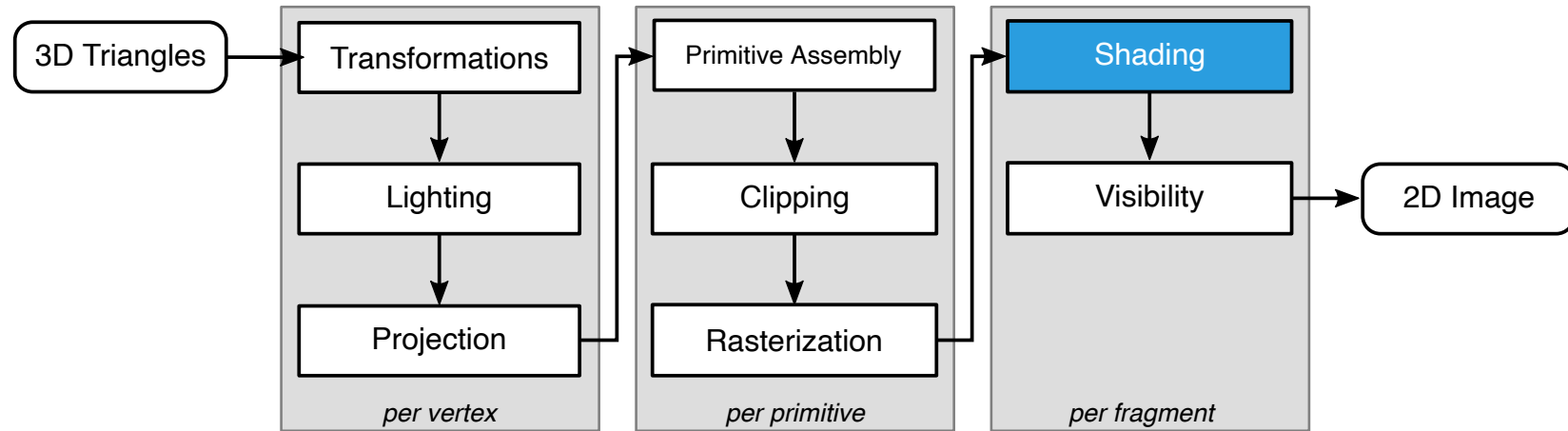
Clipping



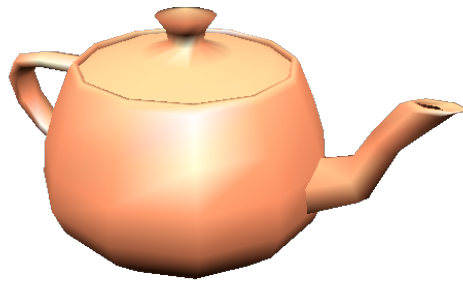
Rasterization



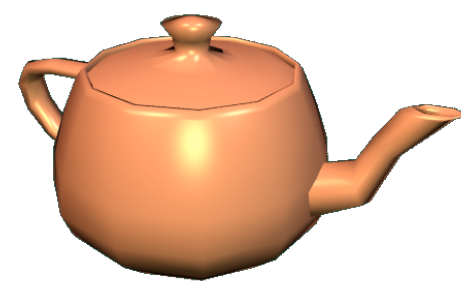
Shading



flat (constant)

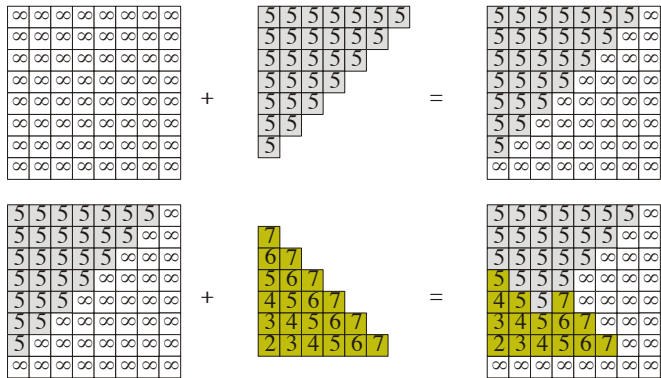
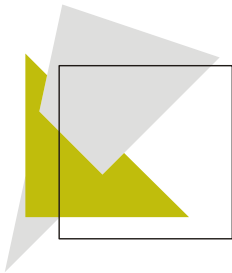
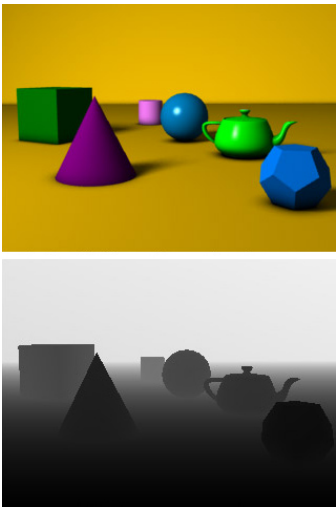
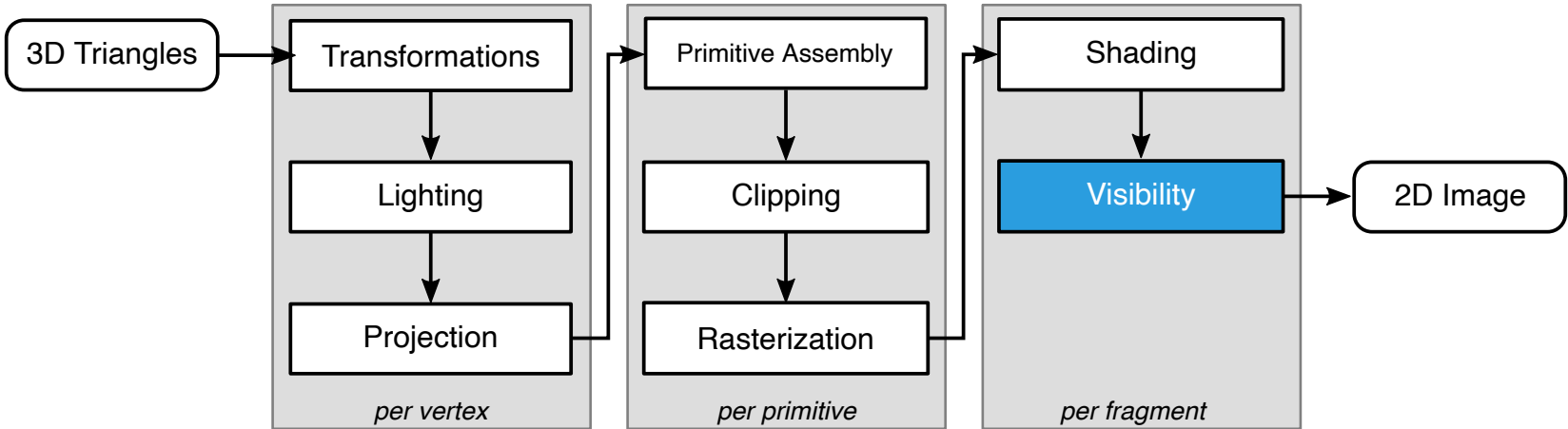


per-vertex (Gouraud)

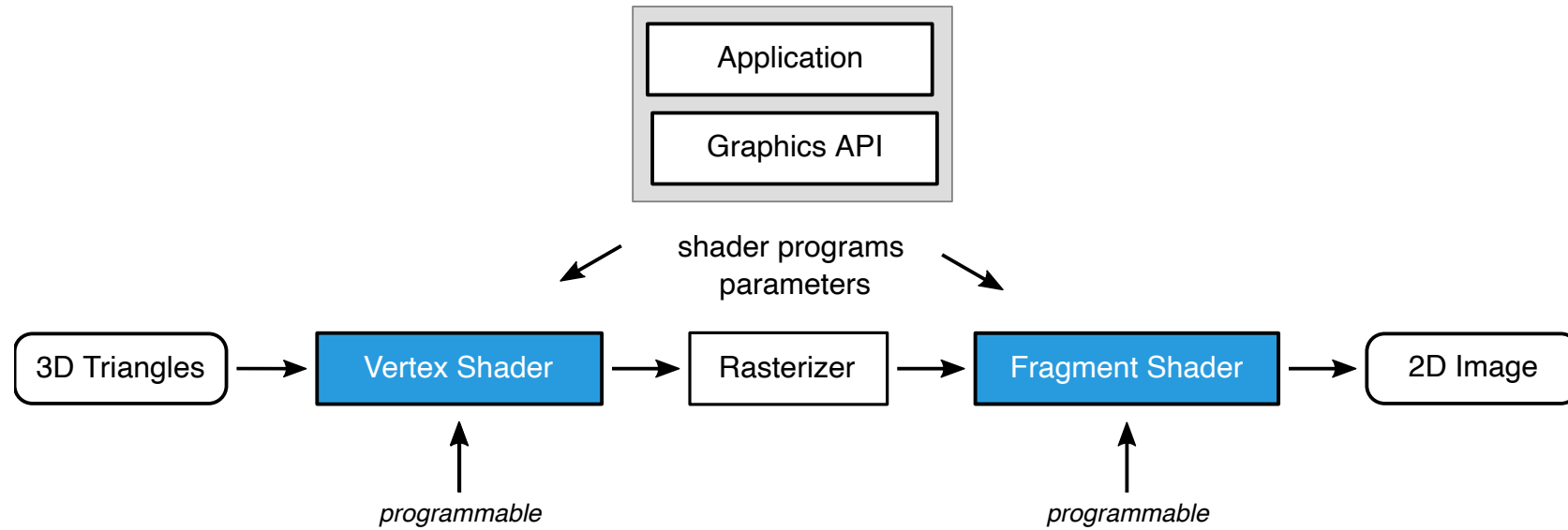


per-fragment (Phong)

Visibility



GPU Rasterization Pipeline



Computer Graphics APIs

- Low-level rendering (→ rendering commands)
 - OpenGL (Open Graphics Library) → Vulkan
 - Microsoft's Direct3D, Apple's Metal, AMD's Mantle
 - ...
- High-level scene graphs (→ scene description)
 - OpenInventor, OpenSG, InstantReality, VTK, Java3D
 - ...
- Game engines (→ rendering & more)
 - Unity, Unreal
 - ...

What is OpenGL?

- Computer graphics rendering API
 - Render images from geometry and image data
 - Process simple primitives (points, lines, triangles)
 - Create interactive 3D graphics applications!
 - See <http://www.opengl.org>
- OpenGL
 - is hardware accelerated (Nvidia, ATI/AMD, Intel, ...)
 - runs on many operating systems (Linux, Mac, Windows)
 - runs on mobile devices (OpenGL ES)
 - runs in web browsers (WebGL)

WebGL

- JavaScript Graphics API
- Web-Version of OpenGL
- Why WebGL?
 - Minimal setup
 - Runs in all modern web browsers
- Some advanced OpenGL features not (yet) available

WebGL

WebGL Samples

This is collection of WebGL Samples. Feel free to add more

Ok let's go



More info

