



Culling And Clipping

- 02 Juni 2014-



Inhalte

- Why to do it?
- Culling
 - Basic Culling
 - Back-Face Culling
- Clipping
 - Plane-at-a-Time Clipping
 - Polygon-of-Intersection Clipping



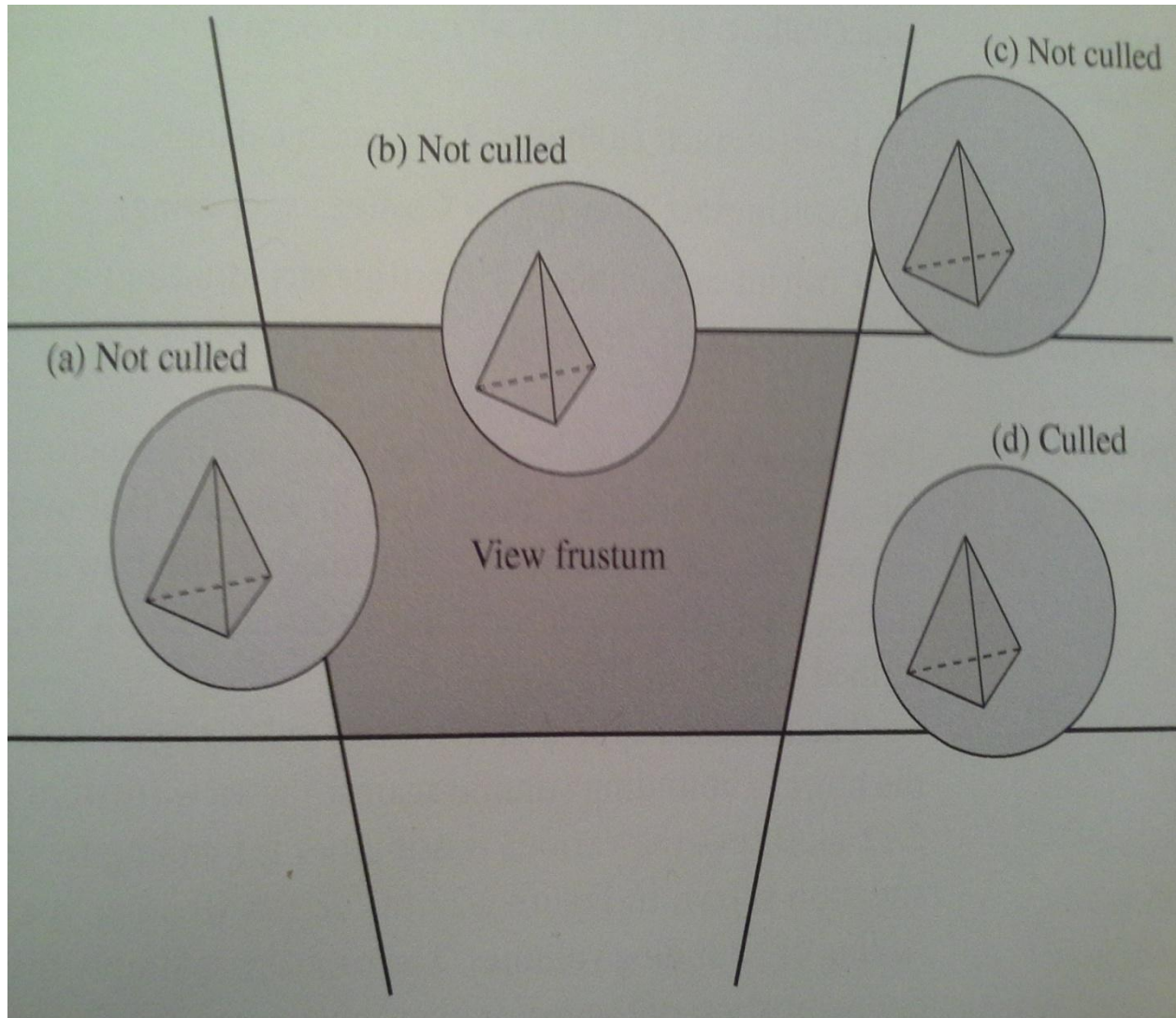
Why to do it?

- Representation of shapes requires huge amount of processing power
- Reduce amount of data sent to the rasterizer for drawing



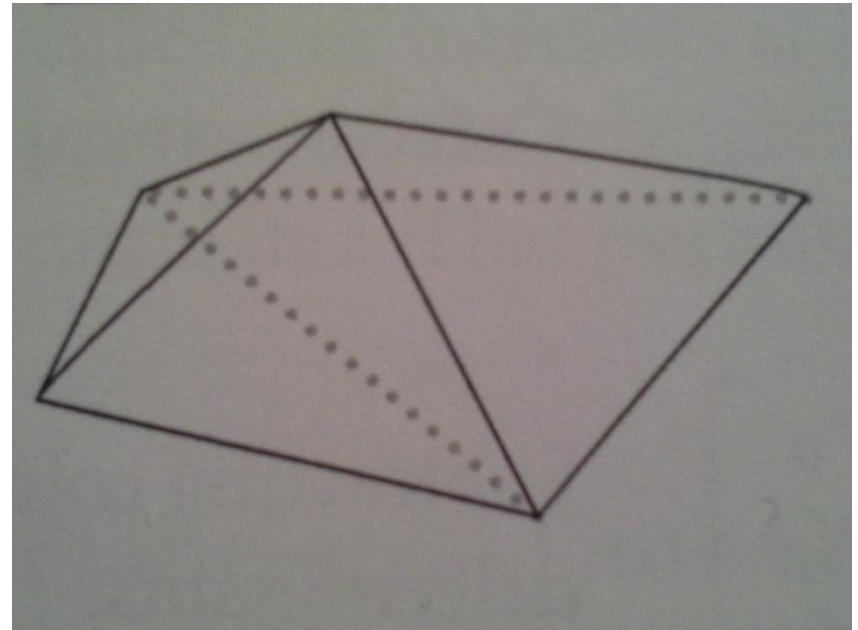
Culling

- Is everything in the frustum?
- Intersections of the object with the frustum
- Use of bounding volume
- Types:
 - **Exact Culling:** requires more processing power
 - **Inexact Culling:** may recognize false intersections
- Decision depends on application



Back-Face Culling

- Is triangle oriented away from eye point?
- Basic idea: use of one normal line (going outside the object) to determine whether the eye point is behind or in front.





Back-Face Culling

- Triangle is front-faced if :

$$\det \begin{bmatrix} r_0 & r_1 & r_2 & 0 \\ u_0 & u_1 & u_2 & 0 \\ d_0 & d_1 & d_2 & 0 \\ 1 & 1 & 1 & 0 \end{bmatrix} > 0$$

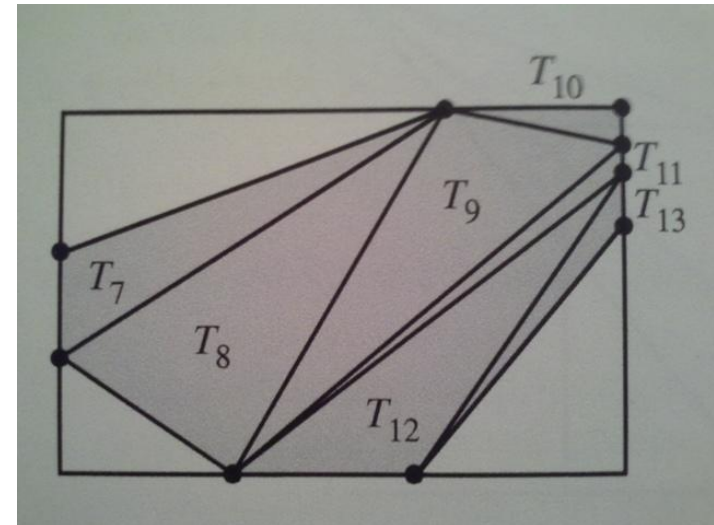
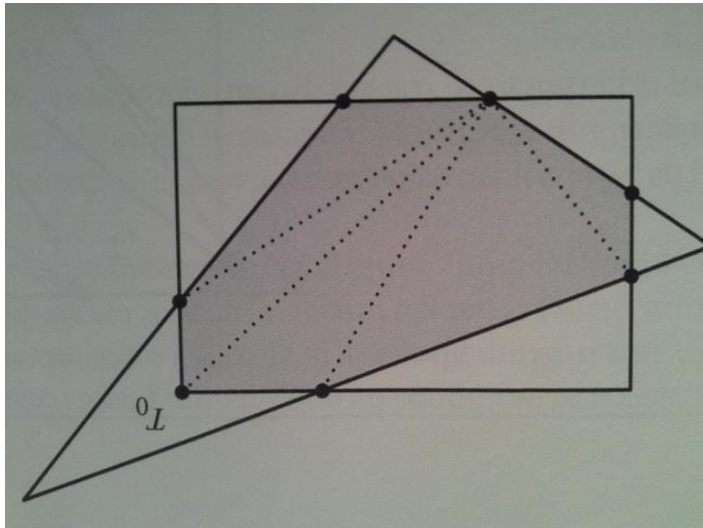


Plane-at-a-Time Clipping

- What to do in case the triangle is intersected by the frustum? → Clipping
- To for every plane of the frustum the triangle and subdivide the result in case it is a quadrilateral
- Positive: Easy structures
- Negative: Maybe more triangles than necessary

Polygon-of-Intersection Clipping

- More complex structures
- Number of triangles \leq Those by Plane-at-a-Time





Literature

- 3D Game Engine Design – David H Eberly



Thank you for your attention