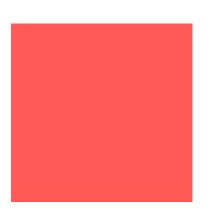# Ray Tracer extensions (part III)

3D Computer Graphics (Lab 11)
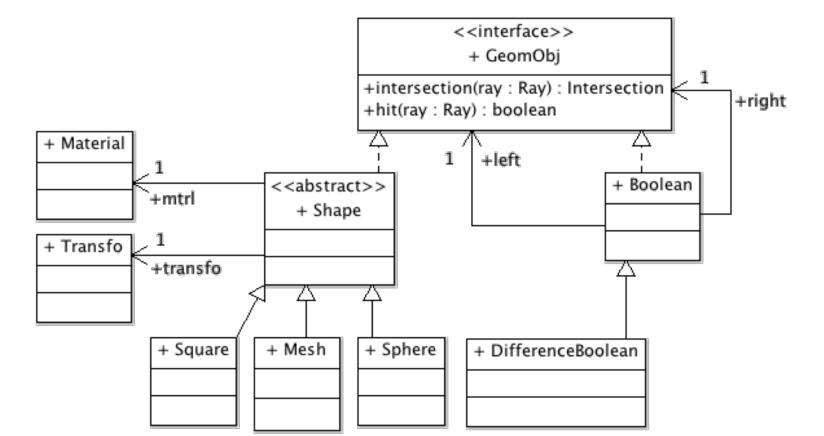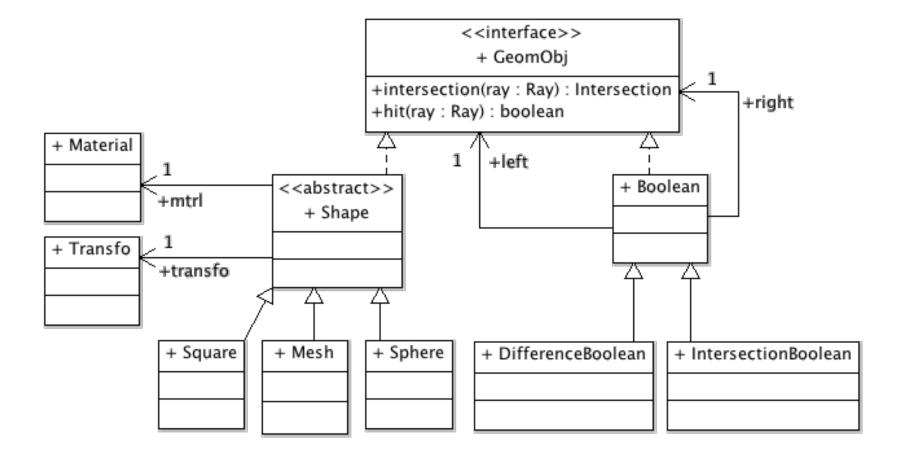
CSG:
the intersection operator

Support for boolean objects
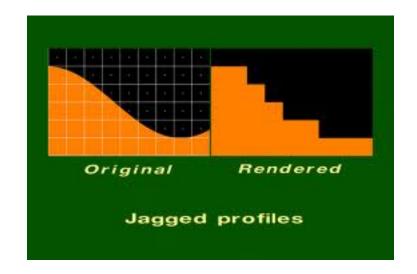
Support for boolean objects

Anti-aliasing techniques:
supersampling

Aliasing

- **(Spatial) aliasing** is a distortion artifact which occurs when an image is rendered on a computer screen.

- Aliasing occurs because pixels are displayed in a fixed rectangular grid.

- This distortion artifact often results in so-called "jaggies", which are stairlike lines that appear where there should be smooth straight lines or curves.

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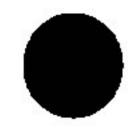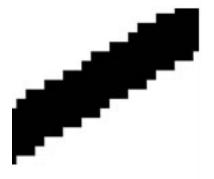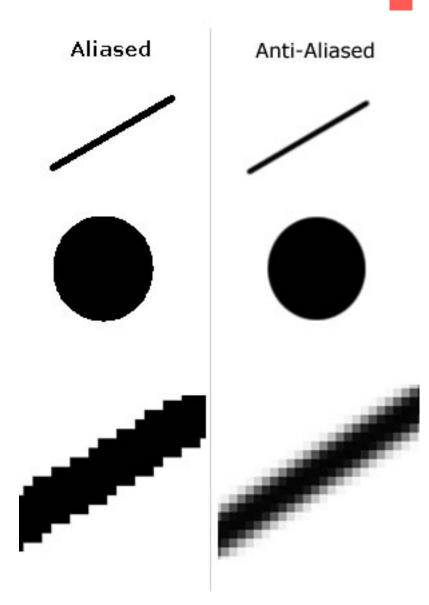
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- We will implement one anti-aliasing technique: **supersampling**.

Aliased   Anti-Aliased

Supersampling

- Our current raytracer takes **one sample per pixel**.

  A ray is cast through the upper left corner of each pixel to find the colour of the hitPoint closest to the start of the ray.

  This colour is set to the entire pixel.

1 sample
per pixel

Supersampling

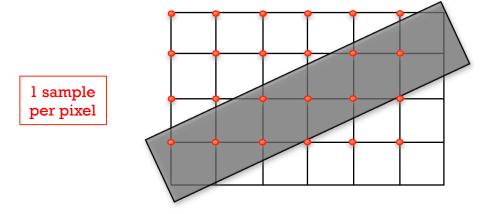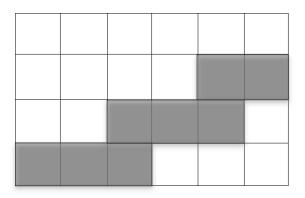- Our current raytracer takes one sample per pixel.

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- Supersampling takes multiple samples per pixel.

  A ray is cast through each sample. Each sample yields a colour.

  The average of these colours is set to the entire pixel.

Supersampling

1 sample per pixel

4 samples per pixel

9 samples per pixel

Supersampling

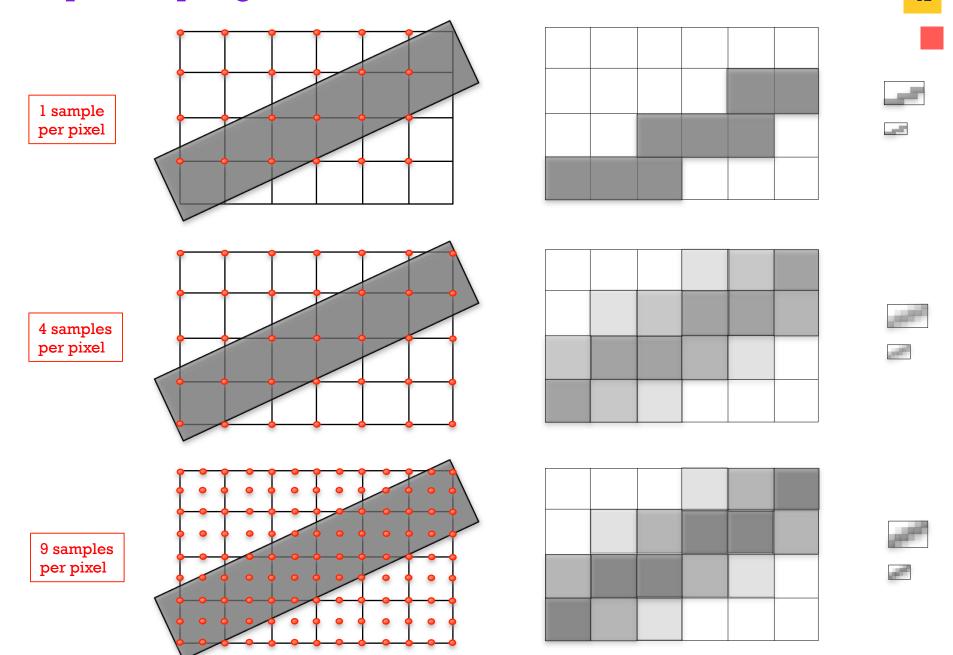- Our current raytracer takes **one sample per pixel**.

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- Supersampling is the easiest anti-aliasing technique.

- Supersampling gives the highest possible quality.

- But supersampling is computationally very expensive.

Questions?