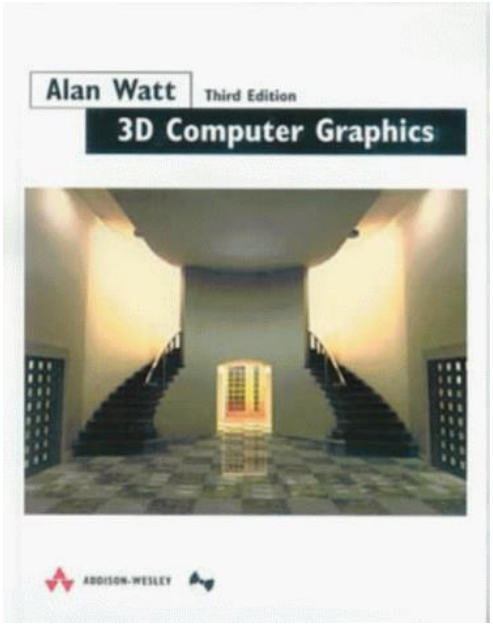
The University Of Sheffield.

COM3503/4503/6503: 3D Computer Graphics

Lecture 20: From local to global illumination



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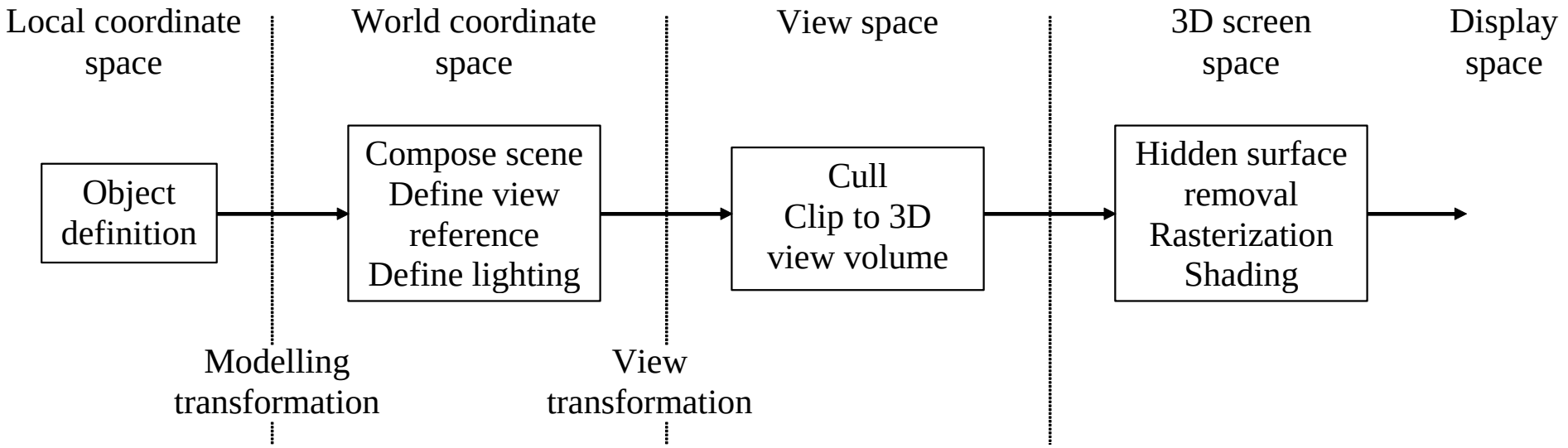
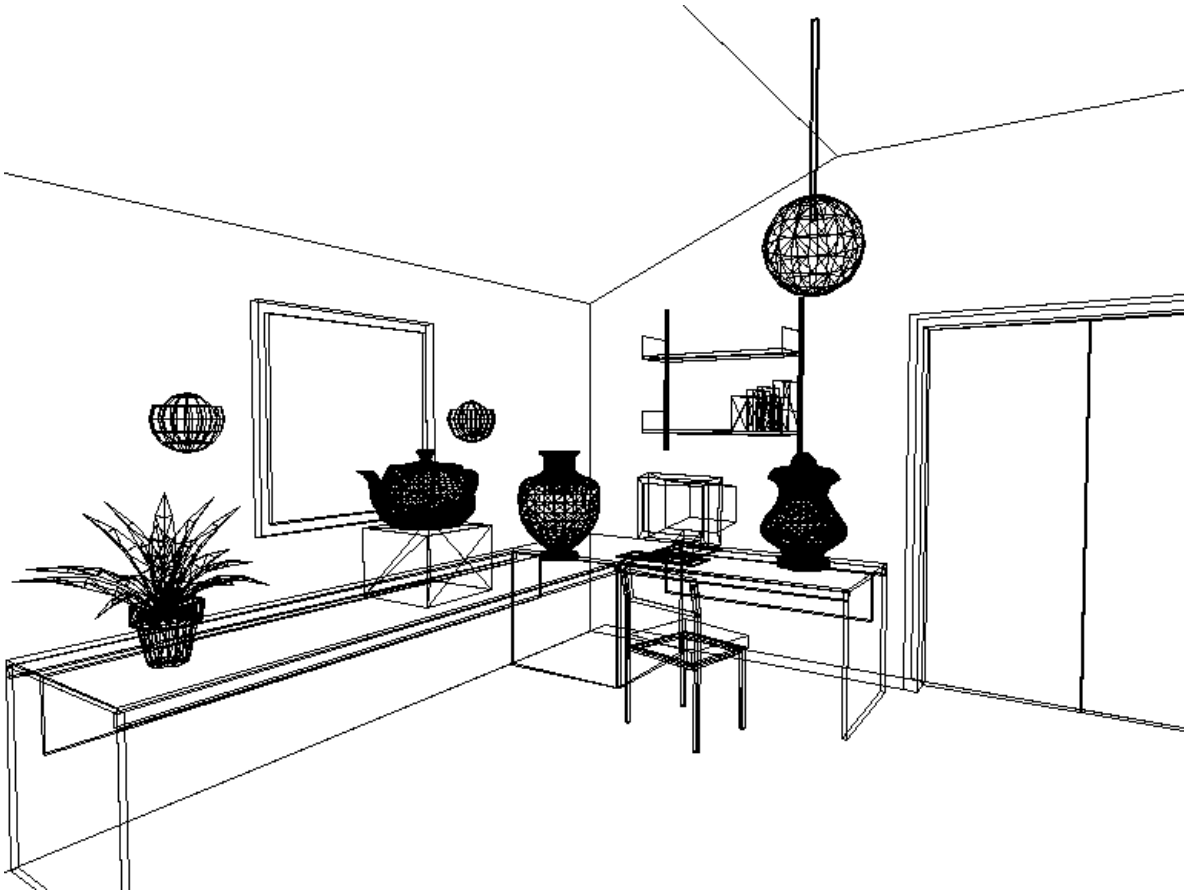
1. The graphics pipeline



- We will look at a range of images that illustrate the difference between local and global illumination.
  - Example scene: ~10000 polygons.

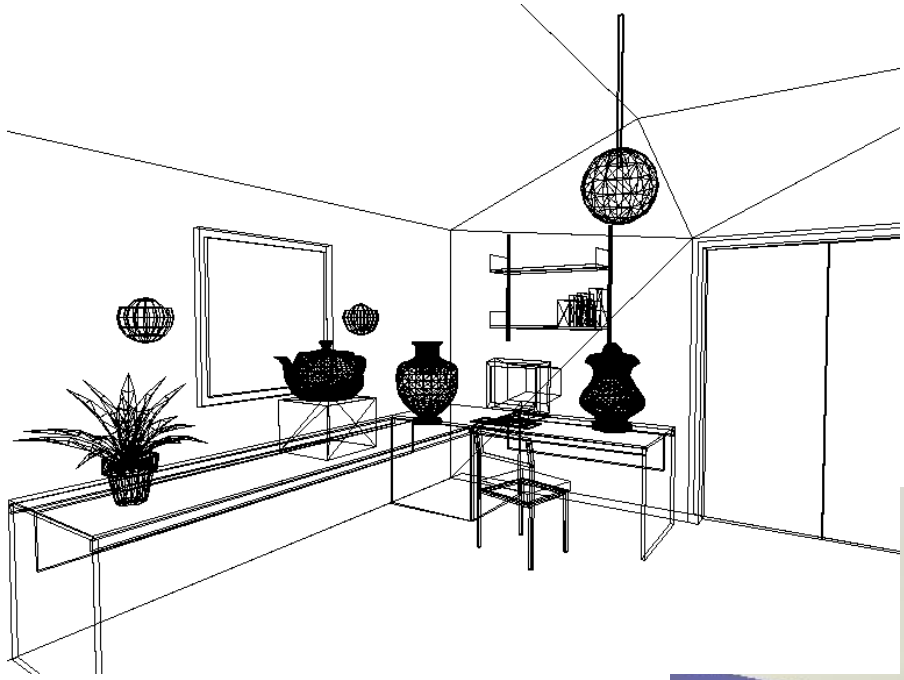
2. Local reflection models and interpolative shading

- $I = k_a I_a + I_i(k_d(\mathbf{L}.\mathbf{N}) + k_s(\mathbf{N}.\mathbf{H})^n)$
- Wireframe:



2.1 Ambient term only

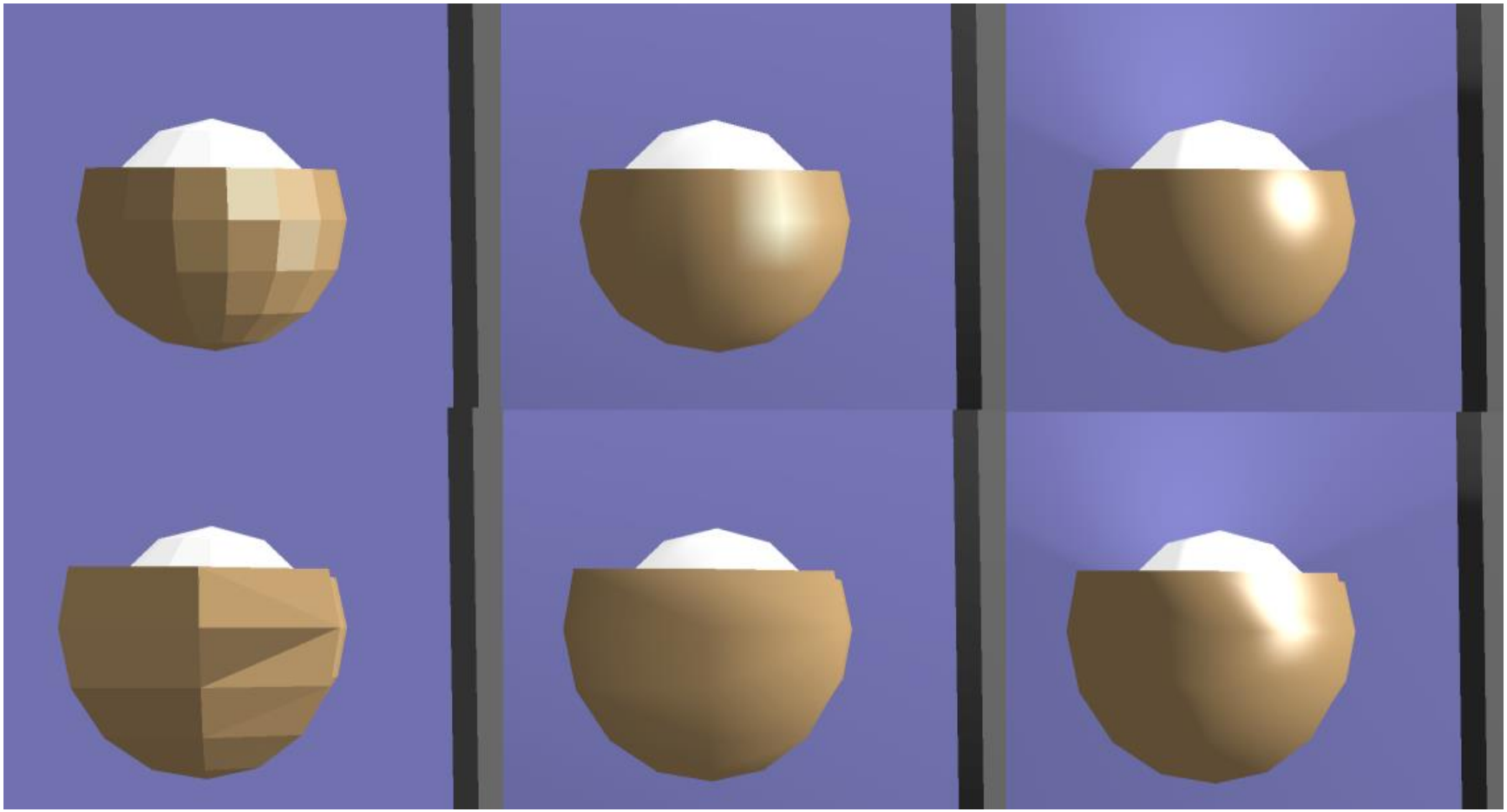
2.2 Flat shading



2.3 Gouraud interpolative shading – interpolate intensities

2.4 Phong interpolative shading – interpolate normals

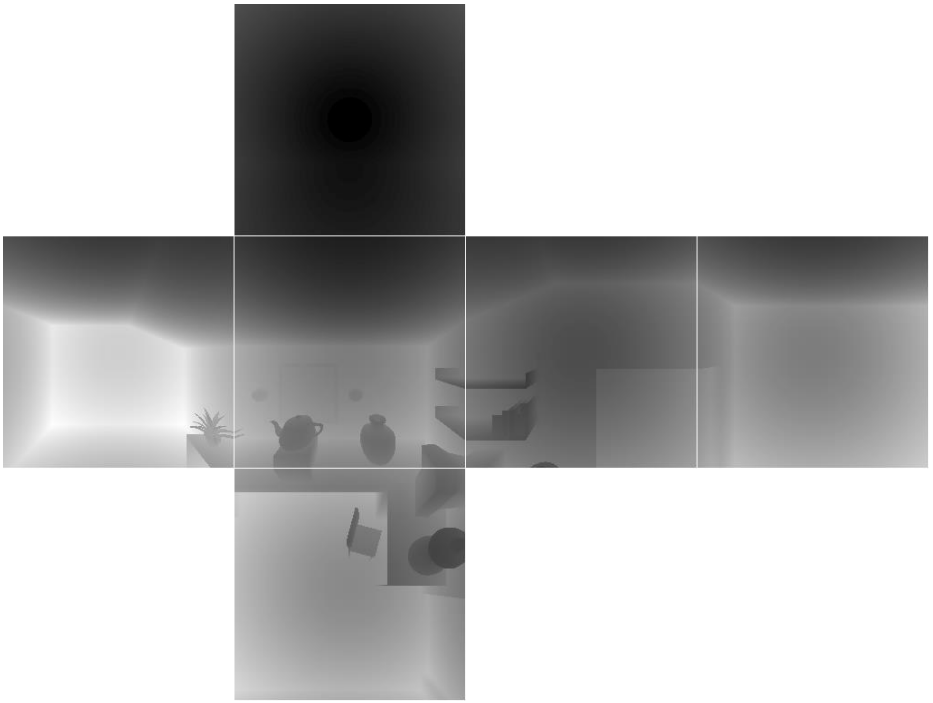
2.5 Comparison

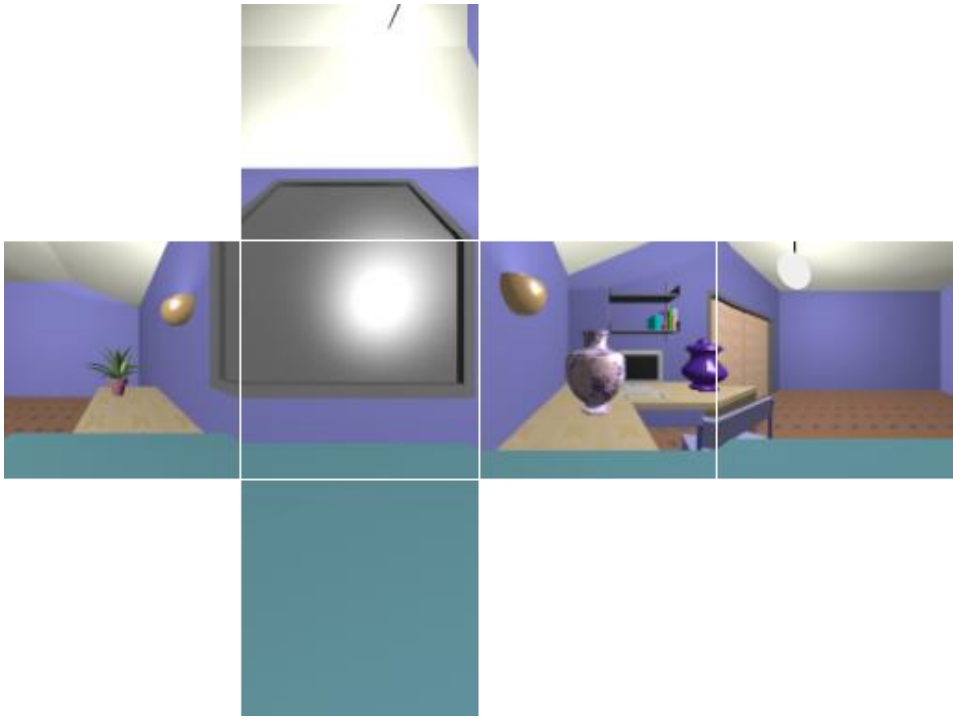


2.6 Traditional 2D texture mapping

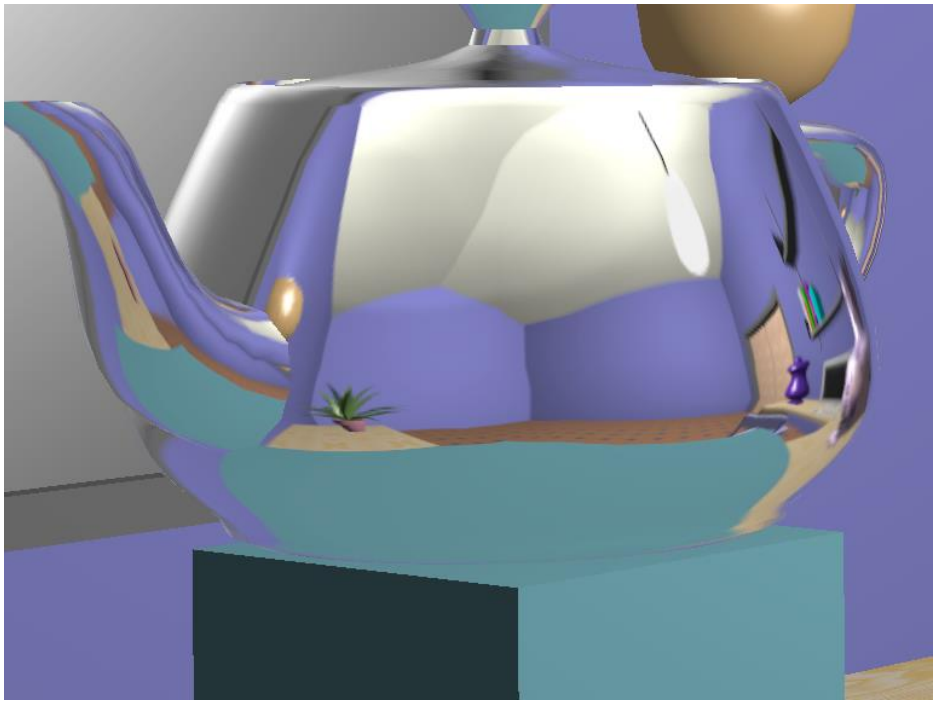
2.7 Shadow and environment mapping

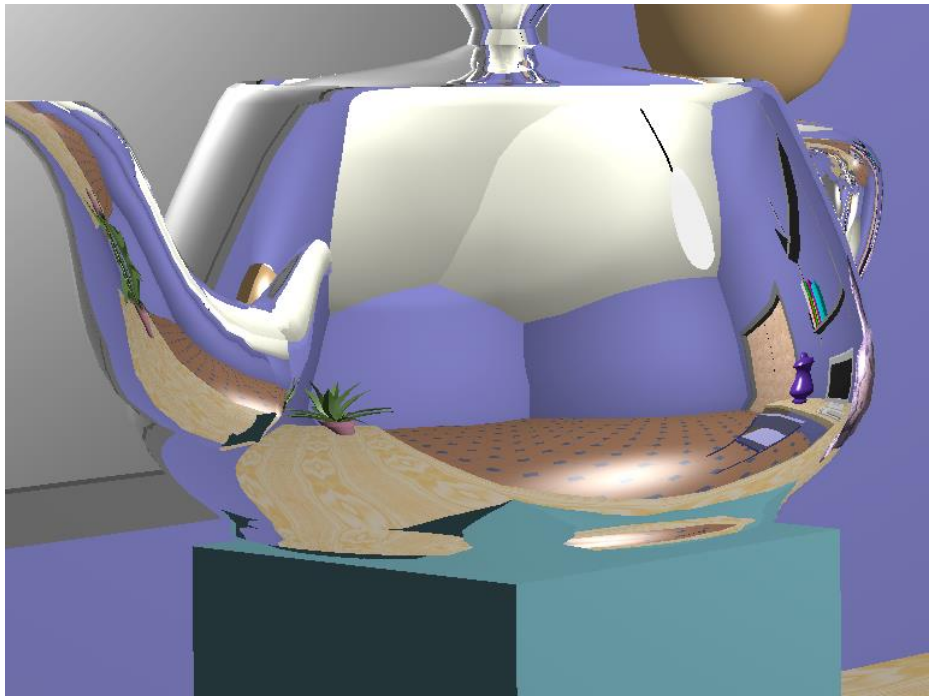
2.7.1 The shadow and environment maps





2.7.2 Comparison of environment mapping with ray tracing

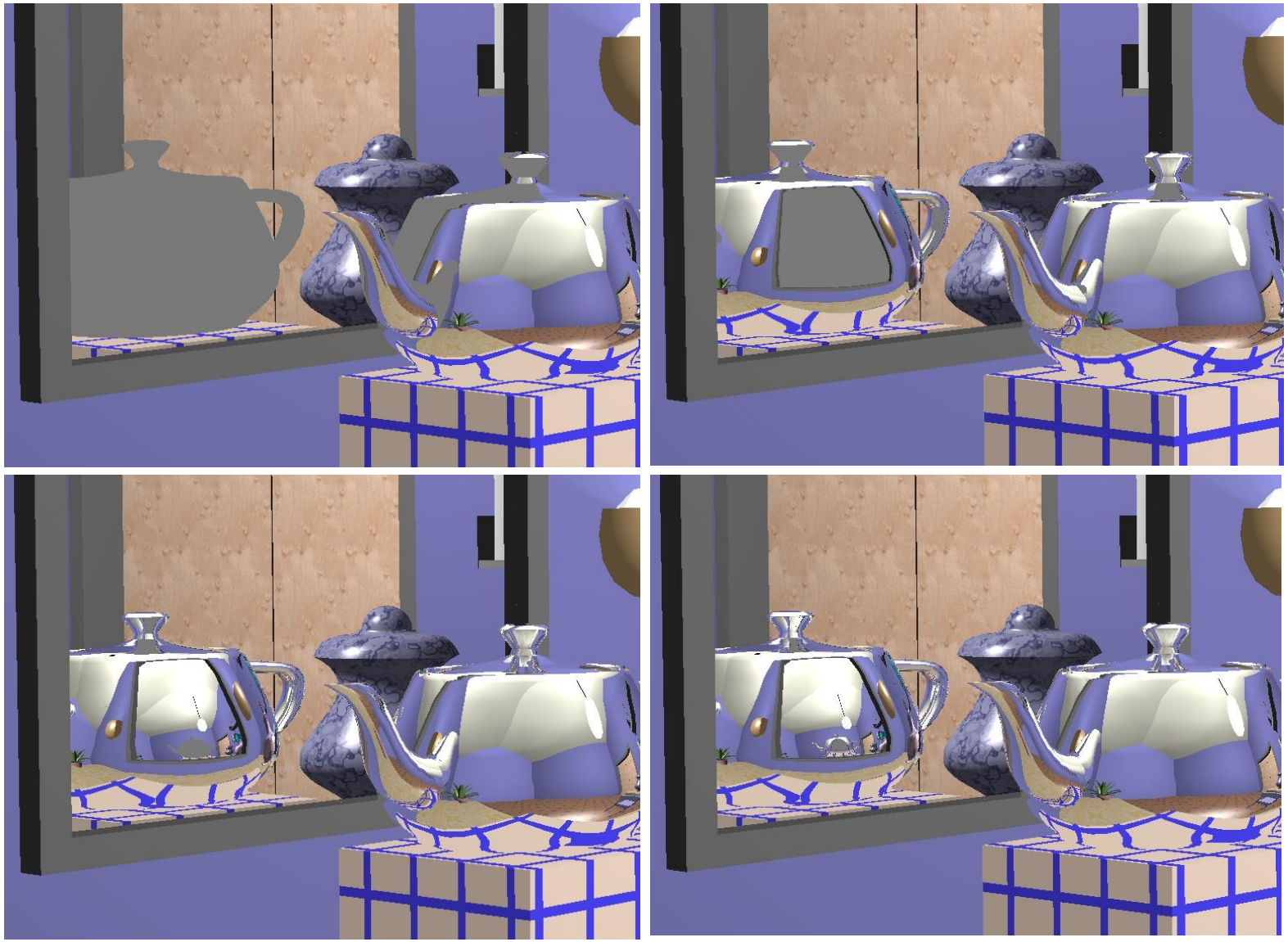


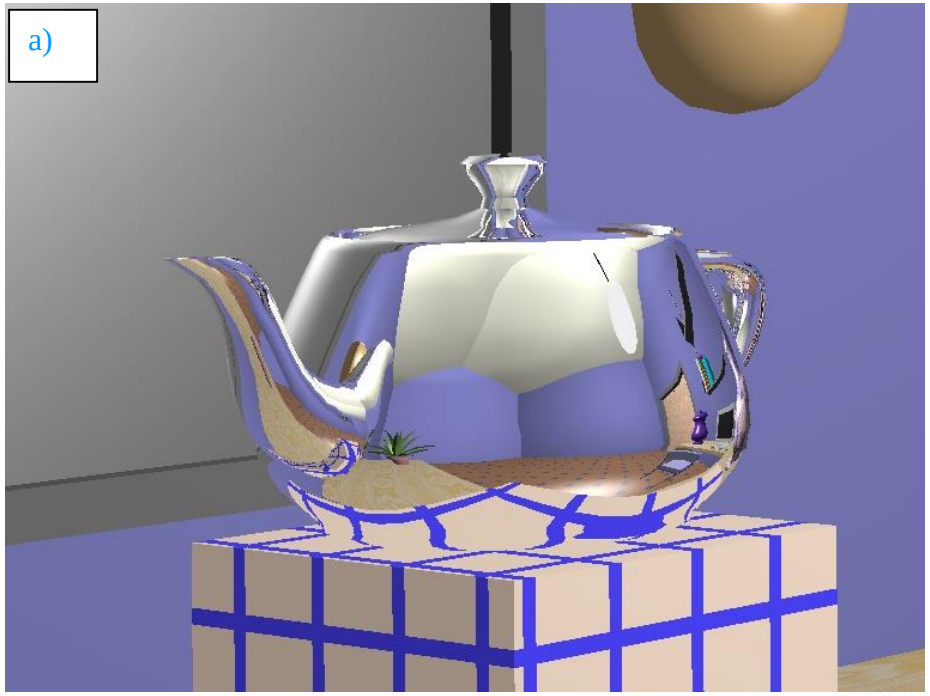


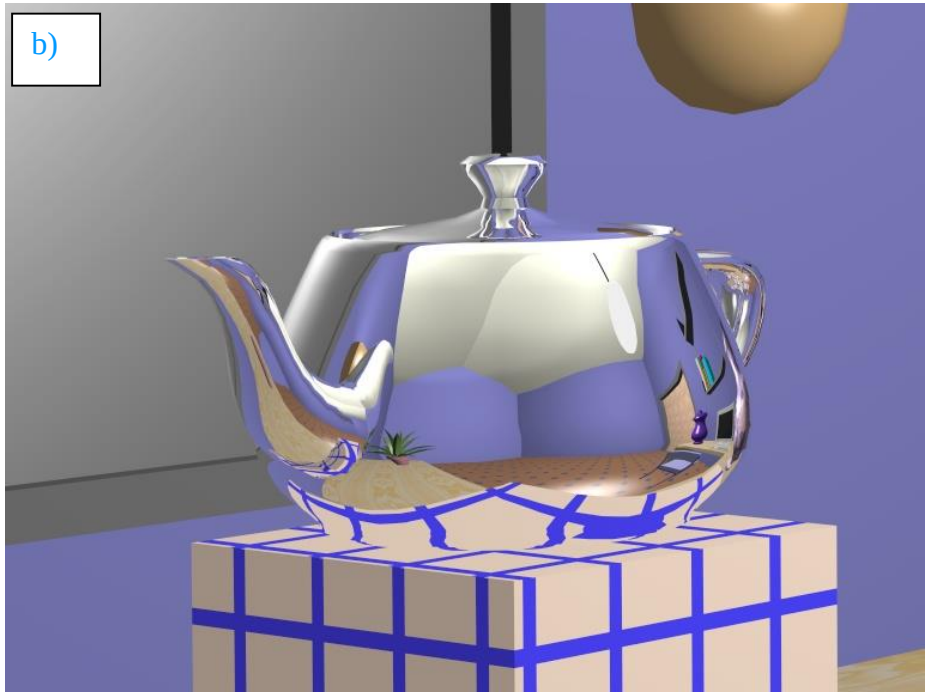
3. Ray tracing

- Global illumination algorithms take into account both direct and indirect illumination

3.1 Levels of recursion





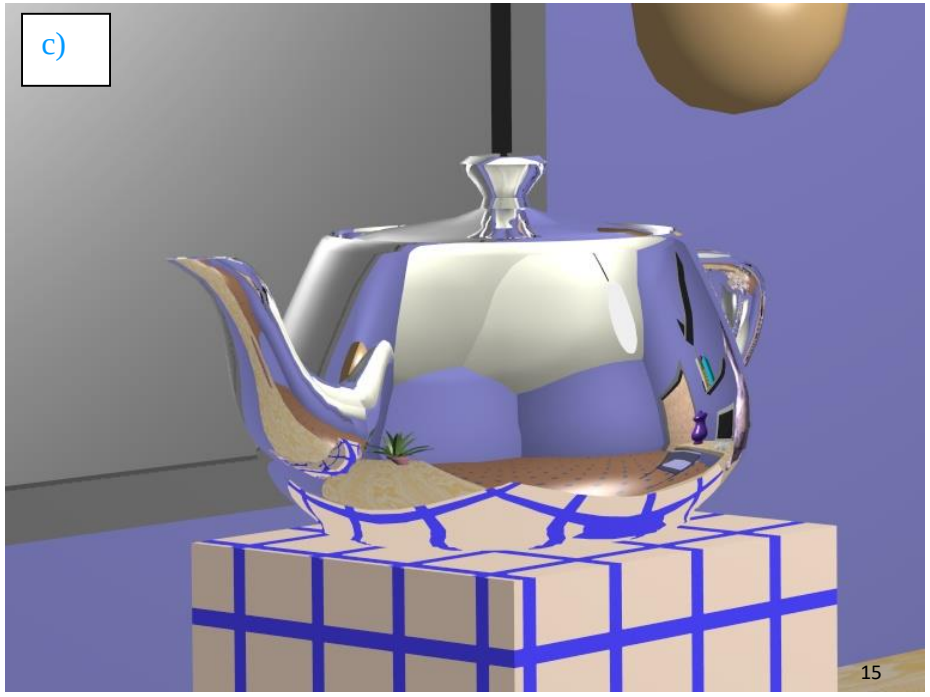


3.2 Anti-aliasing

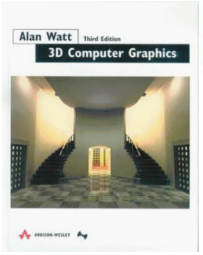
a) none

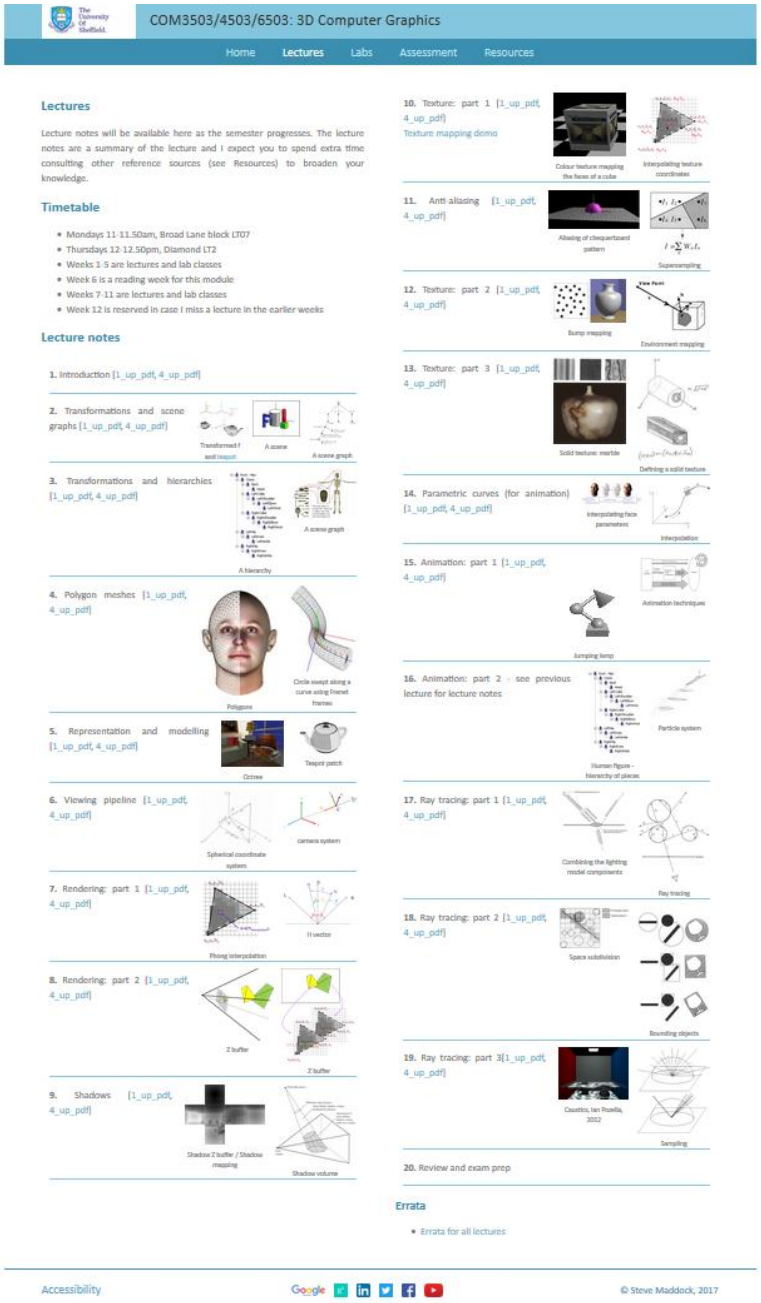
b) supersampling (x3)

c) non-uniform sampling



9. Summary





In the course we have covered:

- Representation and modeling;
- Transformations;
- The graphics pipeline;
- The Phong local reflection model;
- Z-buffer;
- Textures;
- Shadows;
- Anti-aliasing;
- Intro to animation;
- Ray tracing;
- A brief look at global illumination;
- A recognized standard: OpenGL.

Hope you have enjoyed it.