



Accelerating Volume Rendering

Johns Hopkins Department of Computer Science
Course 600.456: Rendering Techniques, Professor: Jonathan Cohen



Accelerating Volume Rendering

Ray casting

- Alpha-cutoff
- Space leaping

Splatting

- Hierarchical splatting
- Texture splats

Parallel algorithms

- Screen-space subdivision
- Object-space subdivision

3D texture mapping

- Transparent textures
- Shaded isosurfaces

Johns Hopkins Department of Computer Science
Course 600.456: Rendering Techniques, Professor: Jonathan Cohen



Video

State et al., “Interactive Volume Visualization on a Heterogeneous Message-Passing Multicomputer,” *Proceedings of the 1995 Symposium on Interactive 3D Graphics*.

Johns Hopkins Department of Computer Science
Course 600.456: Rendering Techniques, Professor: Jonathan Cohen



Texture Splats

Uses texture hardware to apply contribution of each voxel to pixels

Precompute splat kernel texture

For each voxel plane (front-to-back)

For each voxel

Translate textured polygon

Set rgba according to voxel

Render textured polygon

Johns Hopkins Department of Computer Science
Course 600.456: Rendering Techniques, Professor: Jonathan Cohen



3D Texture Map Approach

Load volume data into 3D texture hardware

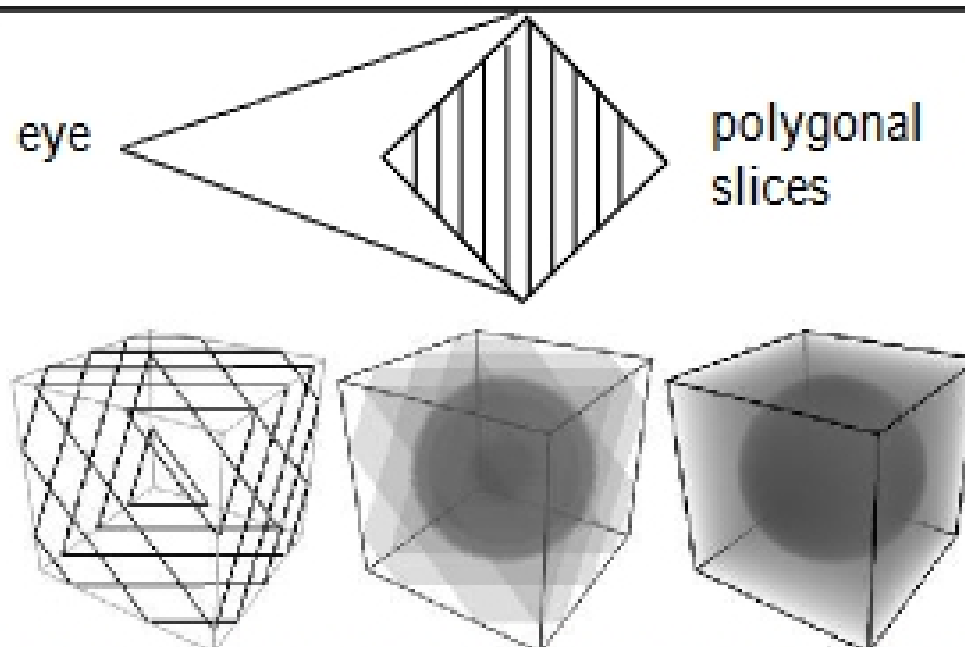
Generate set of slice polygons parallel to viewing plane

Render slices with 3D texture coordinates in front-to-back order

Johns Hopkins Department of Computer Science
Course 600.456: Rendering Techniques, Professor: Jonathan Cohen



Transparent Textures Illustration



from Westermann and Ertl, "Efficiently Using Graphics Hardware in Volume Rendering Applications, *Proceedings of SIGGRAPH 98*, page 170.

Johns Hopkins Department of Computer Science
Course 600.456: Rendering Techniques, Professor: Jonathan Cohen