Lecture 13

Visible Surface Determination

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Readings:
Sections 15.1-15.2, Foley *et al*
(Reference) Hearn and Baker 2e
Slide Set 5, VanDam (8b, 11/09/1999)

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Lecture Outline

- **Readings**
  - **Sections 15.1-15.2, Foley *et al***
  - **Outside reading (optional): Hearn and Baker 2e**
  - **Outside reading (required): Slide Set 5, VanDam (11/09/1999)**
- **Recently**
  - **Surface models and solid modeling**
  - **Color theory**
- **Today**
  - **Quick review**
    - **Visible surface data structures**
    - **Overview of basic problem**
  - **Visible surface determination (VSD) algorithms**
    - **Back-face culling**
    - **Depth buffer *aka* z-buffer**
    - **Depth sort algorithms: painter's algorithm, etc.**
- **Next Class: Realism, Midterm Review**

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Terminology

- **Visible Surface Determination (VSD)**
  - **Ray tracing**
  - **Data structures and associated techniques**
    - **Boundary representations (B-reps): bounding volumes, other models**
    - **Depth buffer**
    - **Priority queue**
    - **Binary space partitioning (BSP) trees**
  - **Associated algorithms**
    - **Quick rejection testing, back-face culling**
    - **Depth buffer *aka* z-buffer algorithms**
    - **Depth sort algorithms: painter's algorithm, etc.**
    - **BSP tree algorithm**
- **Taxonomy of Algorithms**
  - **Depth buffer**
  - **List-priority: depth sort, BSP tree**
  - **Scan line (*aka* sweep line)**

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Summary Points

- **Visible Surface Determination (VSD)**
  - **Ray tracing**
  - **Techniques for efficient VSD**
    - **Perspective transform**
    - **Bounding volumes (cubes and other polyhedra)**
    - **Back-face culling**
  - **Data structures: depth buffer, priority queue, active-edge table (AET)**
  - **Associated algorithms: z-buffer, painter's, sweepline**
- **Taxonomy of VSD Algorithms**
  - **Depth buffer**
  - **List priority**
  - **Scan line**
- **Next Class**
  - **Visual realism (skim Chapter 14, FVD)**
  - **Midterm review (*bring questions!*)**

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