SRGGE Project

Session 1

Base code

- Loads PLY models (http://paulbourke.net/dataformats/ply/)
- Render + Camera (Navigation)

Models

- Armadillo (345K), Happy (1M), Bunny (1.3MB), Dragon (7M), Lucy (28M), ...

6 Lab sessions. Each can have:

- Basic functionality
- Advanced functionality
- Max grade requires: all basic + 3 advanced

Session 1

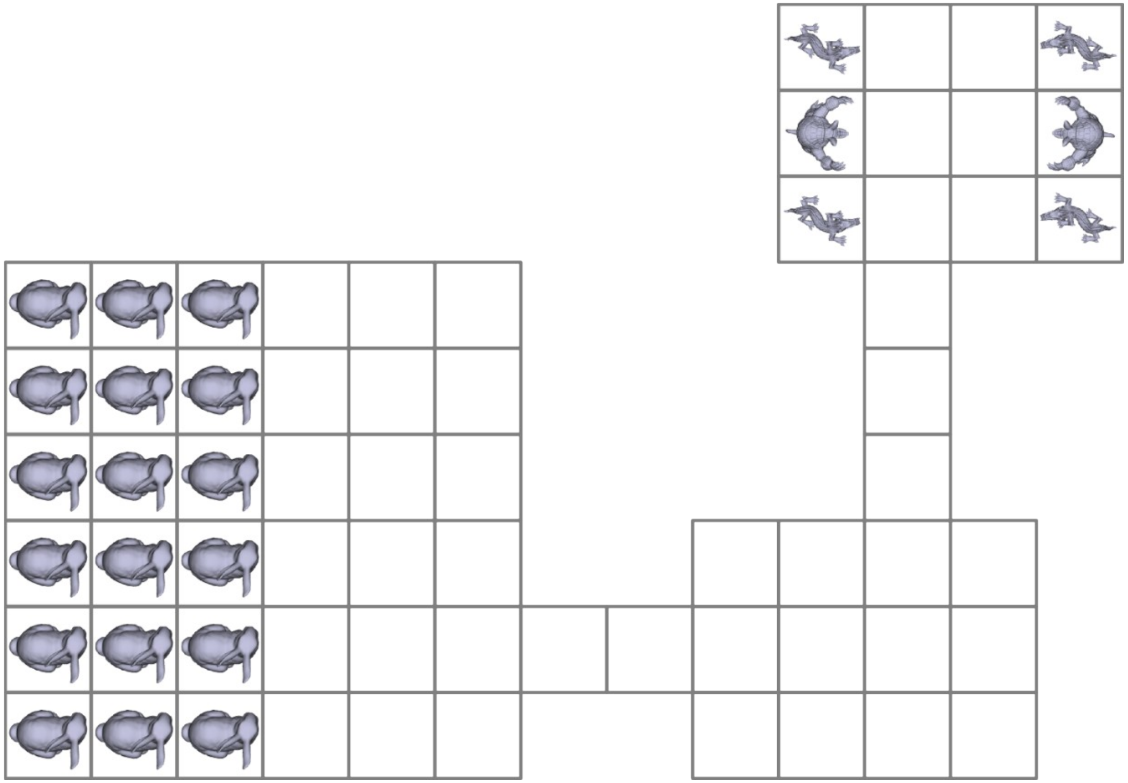
Basic

- Compute framerate & display
- Draw multiple copies of the same object
  - Numerical keys:
    - '1' → 1 copy
    - '2' → 2x2 copies
    - '3' → 3x3 copies
    - ...

Session 2

Basic

- Basic museum
  - Tile-based
  - >= 3 rooms



Advanced

- Complex floorplan (>= 10 rooms)

Session 3

Basic

- Compute simplified versions of the loaded model
  - Vertex clustering on a regular grid
  - Representative vertex per cluster: mean
  - 4 LODs (choose sizes)

Advanced

- Use an octree to generate all simplified models simultaneously

Session 4

Basic

- Compute vertex representative using QEM
  - Quadric error metrics
  - Eigen matrix library (http://eigen.tuxfamily.org/) or others

Advanced

- Preservation of thin features
  - Normal clustering (Willmott 2011)

Session 5

Basic

- Time-critical rendering
  - Compute TPS (triangles/second)
  - MaxCost = TPS / FPS
  - Benefit = $1 - d / (2^{L} \cdot D)$
    - L ≡ Clustering level
    - D ≡ Distance between object and viewpoint
    - d ≡ Diagonal of the object's bounding box
  - Max. TotalBenefit, while ensuring that TotalCost < MaxCost

Advanced

- Hysteresis transition

Session 6

Basic

- Precompute cell-to-cell visibility
  - Random visibility sampling
  - Separate non-OpenGL app
  - Store in a file, use during museum visualization

Advanced

  - Preprocess but can be optimized via:
    - Octree ray traversal
    - Supercover Bresenham