



CMSC 491G/691G

Computer Graphics for Games

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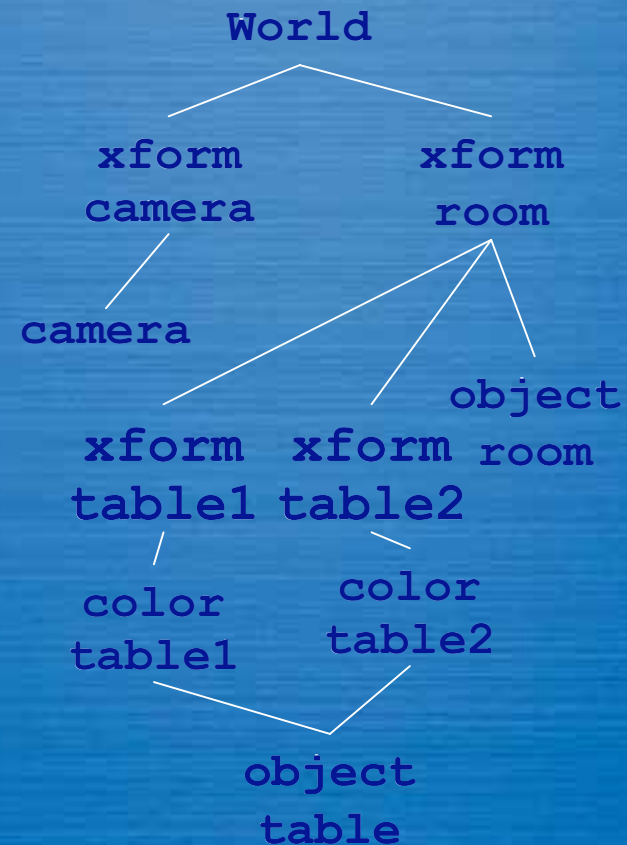


Common Libraries

- Low-level
 - OpenGL, Direct3D
- Interaction
 - GLX
 - GLUT, FLTK, GLUI, DirectInput
- Scene Graph
 - Performer, OpenSceneGraph
- Middleware / *Game Engines*
 - Renderware, Gamebryo, Unreal Engine
 - Ogre, Irrlicht, Crystal Space, Wild Magic
 - (Alchemy)

Scene Graph Rendering

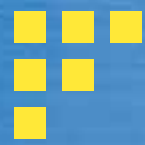
- Traverse Graph
- Display actions
 - 1-handful GL calls
- Options
 - action does traversal
 - pre & post actions
 - SG state management





Scene Graph Traversal

- Not just for rendering
- Save
 - Rather than render, print to file
- Optimize
 - Sort by state changes
 - Sort by distance for transparency
- Produce intermediate *display list*



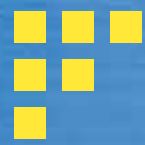
OSG Node

- Generic Node class
 - Inherits Name & Reference counting
 - Parents / Children
 - *StateSet*
 - Bounds
 - Callbacks
 - Event, Update, Cull



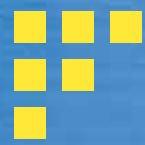
OSG Node Types

- Geometry Node
 - Contains Drawable
- Group Node
 - Simple Grouping
 - Transform
 - Switch / Level of Detail
 - Light Source



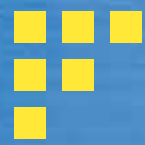
OSG StateSet

- Attach to any Node
- Applies to subtree
 - Merge sets
- Set of Attributes
 - Texturing, Shading, Drawing modes, Blending, ...



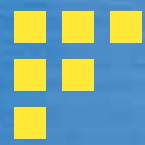
OSG NodeVisitor

- C++ Mechanics
 - Node::accept(NodeVisitor&)
 - Also ascend and traverse
 - MyNodeVisitor::apply(MyNode&)
- Uses
 - Compute bound, Cull
 - Optimize, Simplify
 - Intersect
 - Smooth



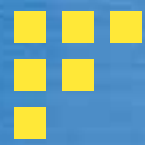
OSG RenderBins

- Rather than render, create a bin
- Opaque vs. Transparent
- Multi-threading



OSG Add-ons

- Node kits
 - Specialized nodes
 - Particles, shadows, ...
- ReaderWriter
 - Plug-ins to read & save
 - Geometry
 - Images



Using Multiple Cores

- Pipeline of processes
 - Application
 - Cull
 - Draw
- Rohlf & Helman, SIGGRAPH 1994