OpenGL ES Introduction
Mr. Nom

• Very successful
• How about more?
What is OpenGL ES

• Industry standard

• Versions: 1.0, 1.1, 2.0 and 3.0

• Either 1.x or 2.0
Programming Model

- OpenGL is a 3D graphics programming API
- C header files
- Working like a camera
  - Take a picture
  - Has camera properties
Programming Model Cont.

- Objects
- Lights
- Camera
- Viewport
Projections

- Parallel (orthographic) projection
- Perspective projection
Projection Planes

• Clipping planes
Normalized Device Space

- pixelX = (norX + 1) / (viewportWidth + 1) + norX
- pixelY = (norY + 1) / (viewportHeight + 1) + norY
Matrices

• A matrix encodes transformations to be applied to a point.
• By multiplying such a matrix with a point, we apply the transformation to the point.
• We can concatenate transformations stored in separate matrices into a single matrix by multiplying the matrices.
• There’s a special matrix called an *identity matrix*. 
Matrices Cont.

- Model-view matrix
- Projection matrix
- Texture matrix
Rendering Pipeline

- A State Machine