Blending & Transparency

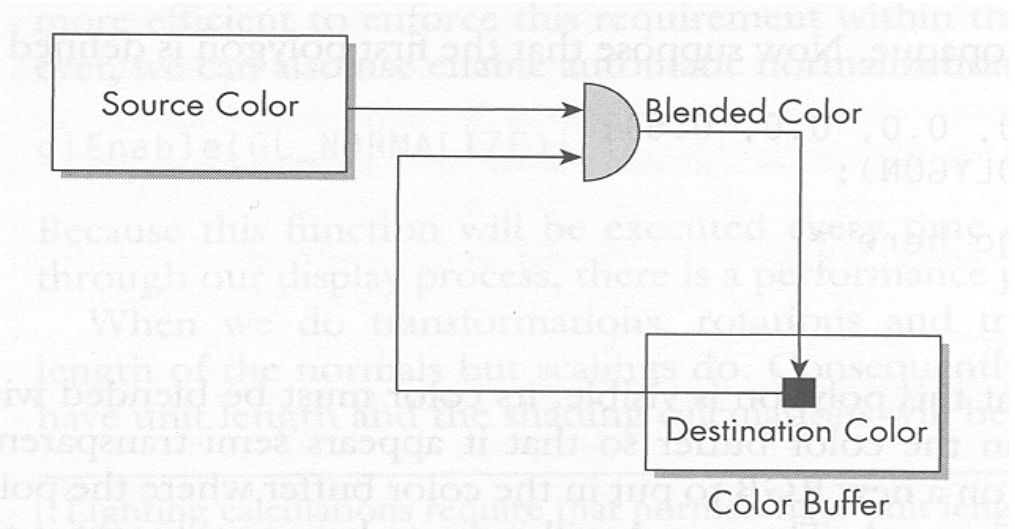
CSCI 4229/5229
Computer Graphics
Fall 2016

Blending Pixels

- Color (R,G,B,α) (4x8 bits = 32 bit color)
  - α blending
  - $R_c = \alpha R_a + (1-\alpha) R_b$
  - $G_c = \alpha G_a + (1-\alpha) G_b$
  - $B_c = \alpha B_a + (1-\alpha) B_b$
- Uses
  - Transparency (1=opaque, 0=invisible)
  - Anti-aliasing
  - Transitions

Blending in OpenGL

- glEnable(GL_BLEND)
- glBlendFunc(source,destination)
  - source (what we're drawing) β
  - destination (what's there already) γ
  - $R_c = \beta R_a + \gamma R_b$
  - $G_c = \beta G_a + \gamma G_b$
  - $B_c = \beta B_a + \gamma B_b$
  - $\alpha_c = \beta \alpha_a + \gamma \alpha_b$
- In general $\beta+\gamma \neq 1$



Source Factors (β)

- GL_ZERO
- GL_ONE
- GL_DST_COLOR
- GL_ONE_MINUS_DST_COLOR
- GL_SRC_ALPHA
- GL_ONE_MINUS_SRC_COLOR
- GL_DST_ALPHA
- GL_ONE_MINUS_DST_ALPHA
- GL_SRC_ALPHA_SATURATE

Destination Factors (γ)

- GL_ZERO
- GL_ONE
- GL_SCR_COLOR
- GL_ONE_MINUS_SRC_COLOR
- GL_SRC_ALPHA
- GL_ONE_MINUS_SRC_COLOR
- GL_DST_ALPHA
- GL_ONE_MINUS_DST_ALPHA

Blending Operations

- GL_ZERO = (0,0,0,0)
- GL_ONE = (1,1,1,1)
- GL_SRC_COLOR = $(R,G,B,\alpha)_S$
- GL_DST_COLOR = $(R,G,B,\alpha)_D$
- GL_ONE_MINUS_SRC_COLOR = $(1, 1,1,1)- (R,G,B,\alpha)_S$
- GL_ONE_MINUS_DST_COLOR = $(1,1,1,1)-(R,G,B,\alpha)_D$
- GL_ONE_MINUS_SRC_ALPHA = $(1,1,1,1)-(\alpha,\alpha,\alpha,\alpha)_S$
- GL_ONE_MINUS_DST_ALPHA = $(1,1,1,1)-(\alpha,\alpha,\alpha,\alpha)_D$
- GL_SRC_ALPHA = $(\alpha,\alpha,\alpha,\alpha)_S$
- GL_DST_ALPHA = $(\alpha,\alpha,\alpha,\alpha)_D$
- GL_SRC_ALPHA_SATURATE = $(f,f,f,1)$ $f=\min(\alpha_S,1-\alpha_D)$

Mixing Objects

- First draw opaque objects
  - Make Z-buffer writable (glDepthMask(1))
  - Set α=1 (but may not matter)
- Next draw translucent objects
  - Make Z-buffer readonly (glDepthMask(0))
  - Set α<1
  - glBlendFunction(GL_SRC_ALPHA,GL_ONE)
- Order (mostly) doesn't matter