Introduction to RenderMan

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History of RenderMan, I

1977: Star Wars IV: A New Hope

1979: Ed Catmull, Alvy Ray Smith, and others leave NYIT to form the Computer Division of Lucasfilm

Image Processing  Digital Editing and Compositing  Effects  Image/Volume Rendering Hardware

1984: John Lassiter leaves Disney Animation to join Pixar
History of RenderMan, II

- Image/Volume Rendering Hardware
- Pixar Image Computer
- Rendering Software
- REYES
- RenderMan
- Pixar Animation Studios
- RIB
- Shade Trees

Star Trek II (1982)
Young Sherlock Holmes (1985)


History of RenderMan, III

- Pixar Animation Studios
- 1986: Steve Jobs buys Pixar for $10M
- Steve Jobs adds another $60M to keep Pixar running
- 1986: Luxo Jr.– Nominated for an Academy Award
- 1988: Tin Toy – won Academy Award for Best Animated Short
- 1993: RenderMan wins a Technical Academy Award
- 1995: Toy Story
- 1995: Pixar IPO – Steve Jobs’s stake is now worth $1.2B
- 2004: Pixar bought by Disney for $7B, making Steve Jobs’s stake now worth $3.5B
- Steve Jobs is now Disney’s largest shareholder (7%) – way ahead of even Roy Disney (1%)
RenderMan Software Rendering Pipeline

1. RIB File
2. Bounding Box Analysis
3. Split
4. Dice into Microfacets
5. Call the Shaders
6. Do Front-to-Back Compositing
7. Assemble the Pixels
8. Final Image
First, let’s think about it back-to-front:

\[
\text{color}_{12} = \alpha_2 \text{color}_2 + (1 - \alpha_2) \text{black},
\]

\[
\text{color}_{01} = \alpha_1 \text{color}_1 + (1 - \alpha_1) \text{color}_{12},
\]

\[
\text{color}^* = \alpha_0 \text{color}_0 + (1 - \alpha_0) \text{color}_{01}.
\]

Substituting gives us the front-to-back equation:

\[
\text{color}^* = \alpha_0 \text{color}_0 + (1 - \alpha_0) \alpha_1 \text{color}_1 + (1 - \alpha_0)(1 - \alpha_1) \alpha_2 \text{color}_2 + (1 - \alpha_0)(1 - \alpha_1)(1 - \alpha_2) \text{black}.
\]