

# **Faster Ray Tracing Using Adaptive Grids**

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# Preprocessing Steps

**FOR** all object

surround object with bounding box

**FOR** all bounding boxes

merge boxes

**FOR** all remaining bounding boxes

apply Goldsmith and salmon's algorithm

**FOR** all bounding boxes

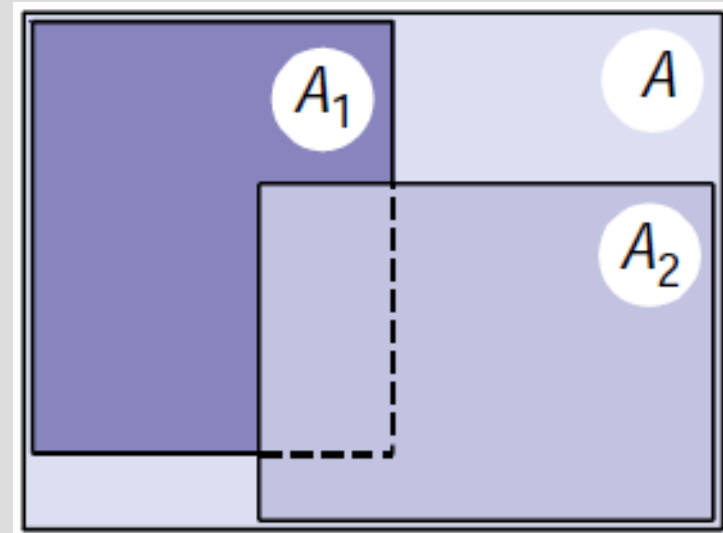
voxelize box

**FOR** each voxel

sub-voxelize this voxel

# Grid merging

$$\frac{A}{(A_1 + A_2)} < f$$

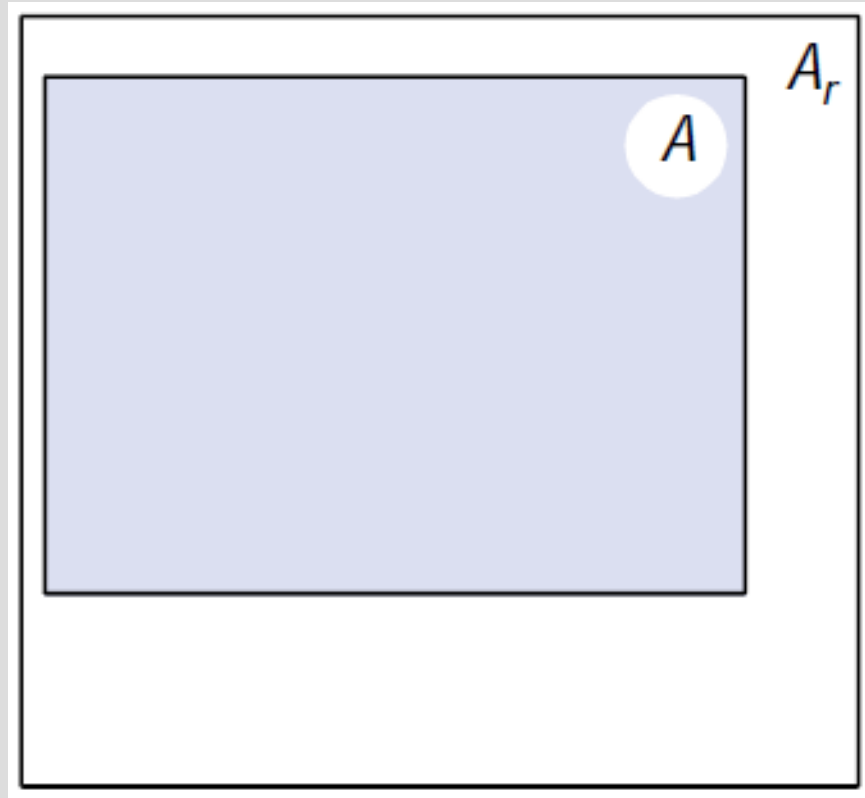


# Grid merging

$$\frac{A}{(A_1 + A_2)} < f$$

$$\frac{A}{A_r} < m$$

$$\frac{A_c}{A} > m$$



Then, apply the Goldsmith Salmon's algorithm

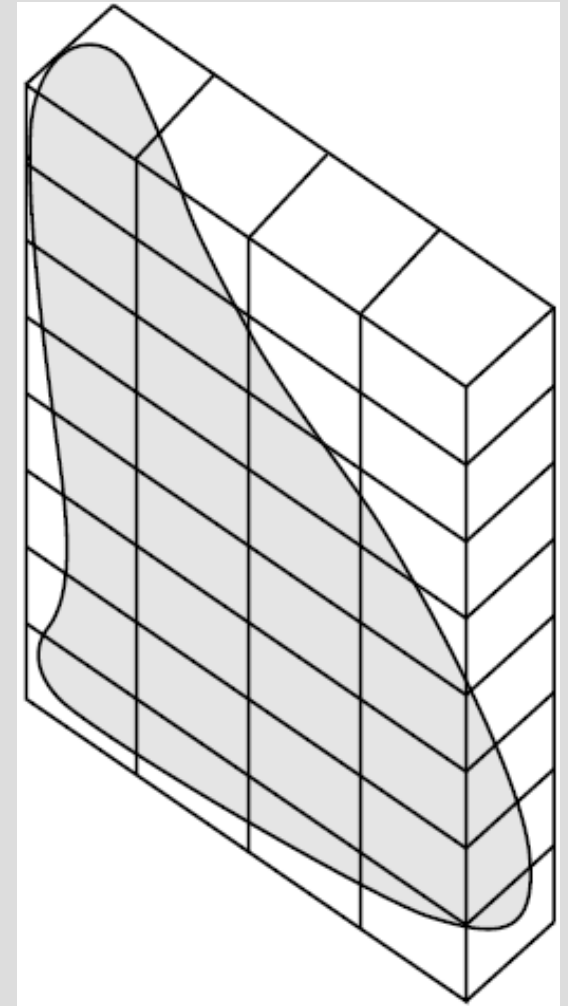
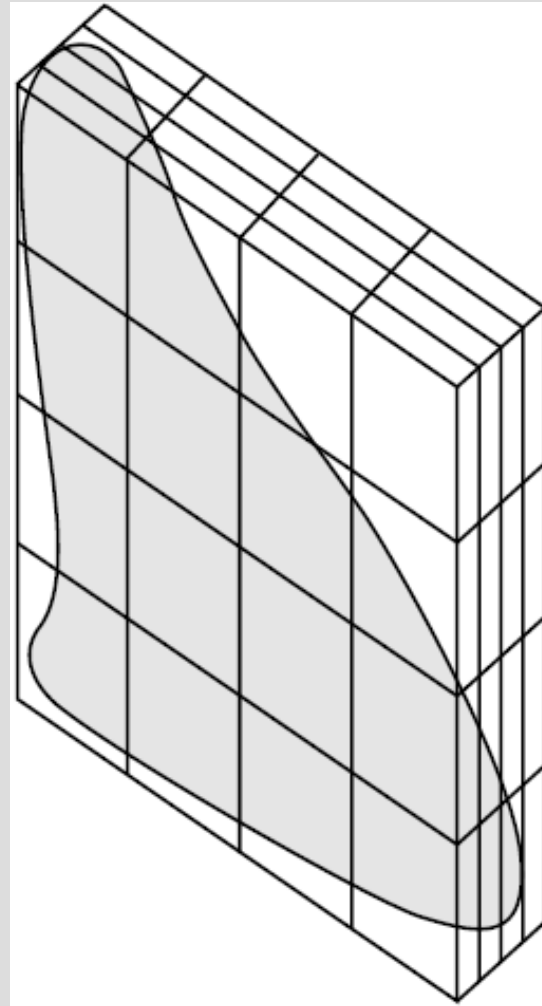
# Heterogeneous grids

$$N = \sqrt[3]{n}$$

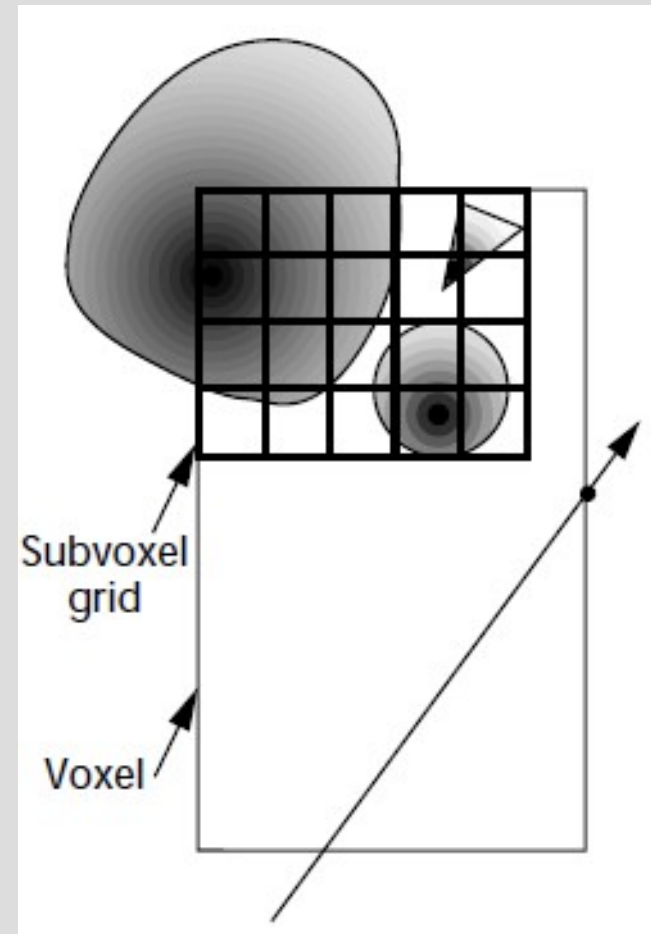
$$N_3 = \text{round} \left( \sqrt[3]{\frac{nX_3^2}{X_1 X_2}} \right)$$

$$N_2 = \text{round} \left( \sqrt{\frac{nX_2}{N_3 X_1}} \right)$$

$$N_1 = \text{round} \left( \frac{n}{N_2 N_3} \right)$$

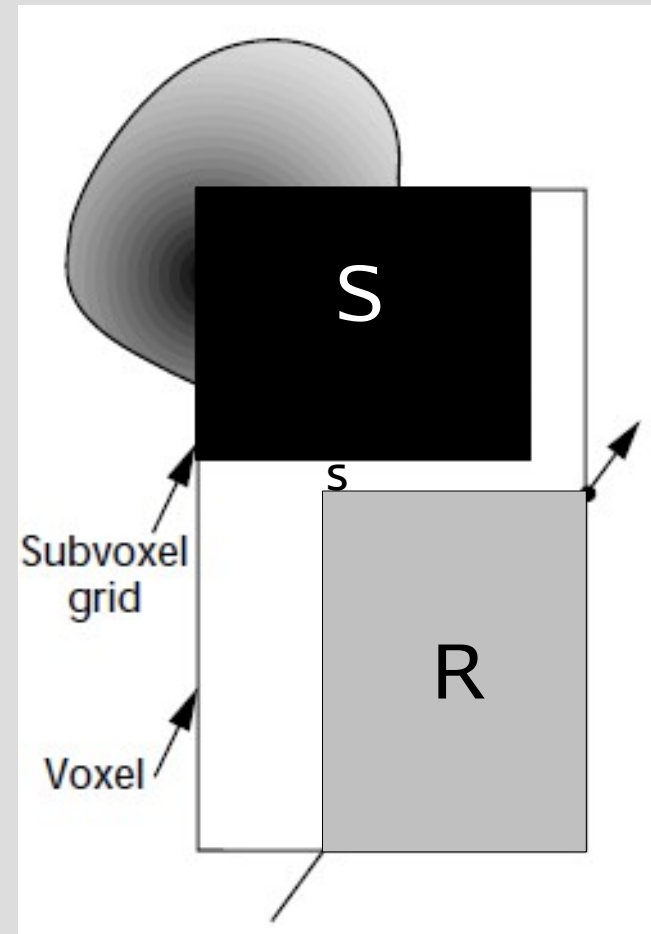


# Subvoxel grids



# Subvoxel grids

$$S_r < R_l \vee S_l > R_r$$
$$S_t < R_b \vee S_b > R_t$$
$$S_f < R_n \vee S_n > R_f$$



**That's all, thank you!**