Computer Graphics

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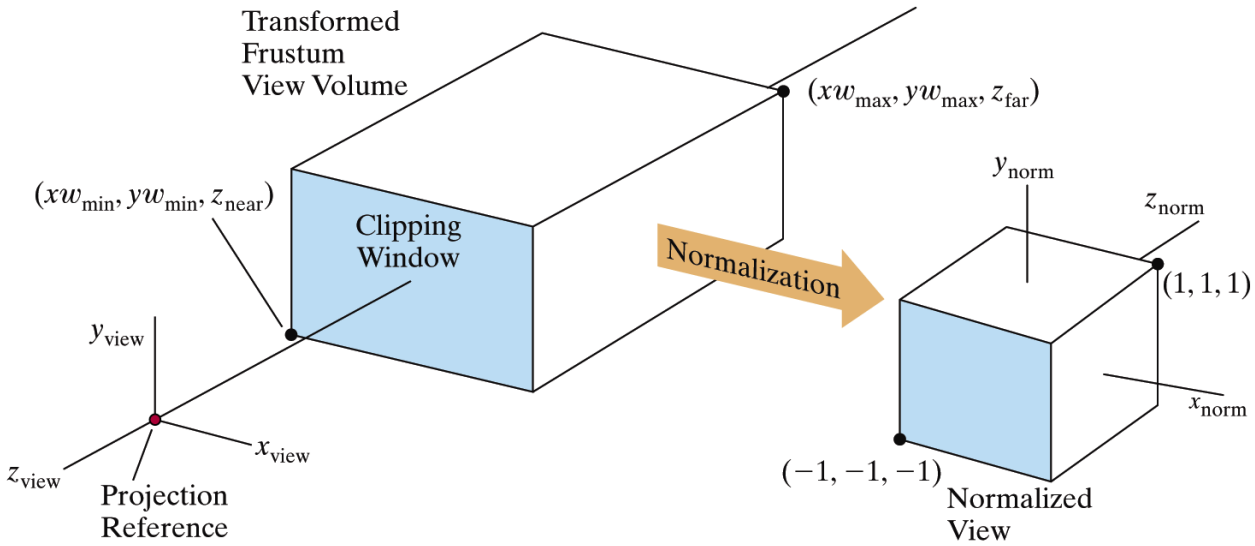
Spring 2021–2022

Outline

Normalization and beyond

- Once we have transformed our world coordinates to view coordinates and then to our [redacted] frustrum...
- If the frustrum was oblique due to choice of PRP and clipping window we would apply a shear transformation to make it symmetric
- By [redacted] coordinates we "box-ify" the frustrum and what results is a transformed frustrum view volume (as in case of orthogonal projection)
- We now need to **normalize this**



Normalization and beyond (contd.)

- We saw last time that the bottom left (Bottom-Left) and top right (TR) coords of the clipping window could be derived either via the pair of values W and H or the pair (θ, AR), wehere θ is the field of view angle and AR is the aspect ratio of window height to width
- Then with the [redacted] determined fully the normalization matrix is (as we have seen before)

$$M_{c,ns} = \begin{pmatrix} \frac{2}{xw_{\max} - xw_{\min}} & 0 & 0 & -\frac{xw_{\max} + xw_{\min}}{xw_{\max} - xw_{\min}} \\ 0 & \frac{2}{yw_{\max} - yw_{\min}} & 0 & -\frac{yw_{\max} + yw_{\min}}{yw_{\max} - yw_{\min}} \\ 0 & 0 & \frac{-2}{z_{\text{near}} - z_{\text{far}}} & \frac{z_{\text{near}} + z_{\text{far}}}{z_{\text{near}} - z_{\text{far}}} \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

Normalization and beyond (contd.)

- Sequence of events to transform from [redacted] to normalized perspective-projection coordinates:
- Form composite matrix of products of $M_{c,ns}$, M_p and viewing transformation product $R \times T$ giving

$$\mathcal{M} = M_{c,ns} \times M_p \times R \times T$$

- Clipping can be applied more easily in this normalized volume
- Then, visibility determination, surface rendering and transformation to device coordinates (via viewport)