ED CATMULL
&
TEXTURE MAPPING

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CONTRIBUTION

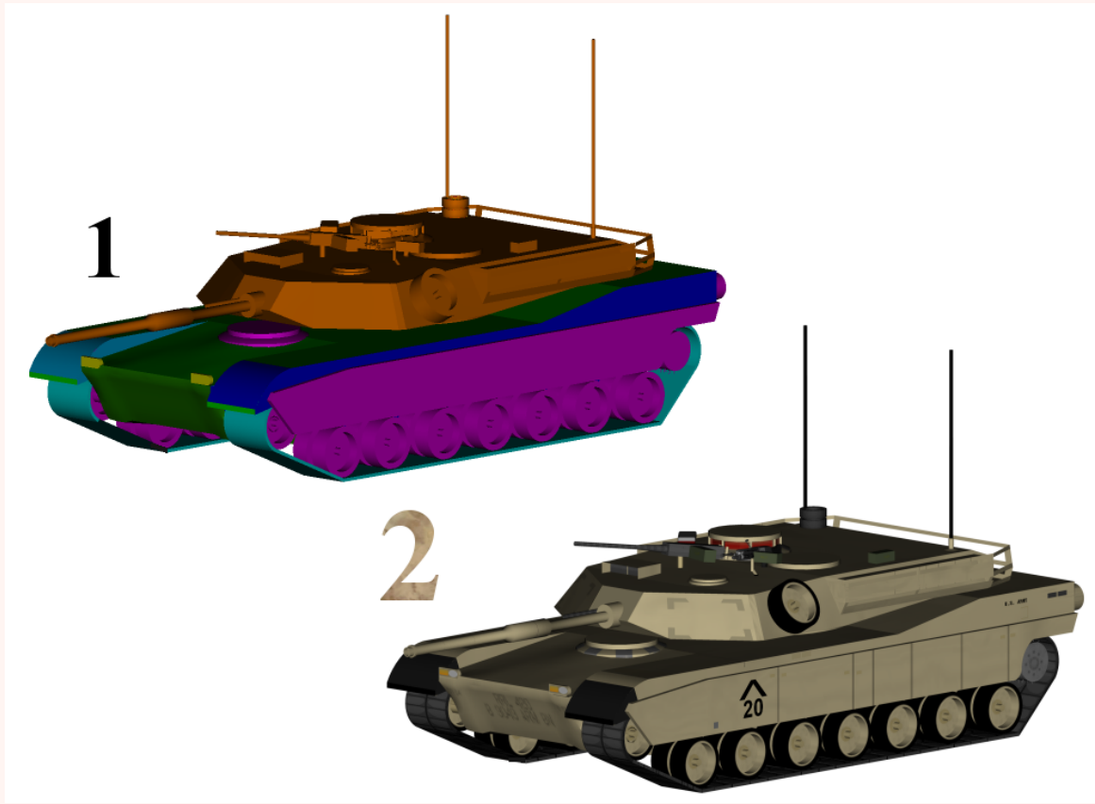
- **Subdivision Methods for Computer Display of Curved Surfaces**
- **Z-Buffering**
- **Texture Mapping**
- **Digital Image Compositing**
- **Reyes Rendering Architecture**
- **PhotoRealistic RenderMan**

TEXTURE MEANS DETAIL

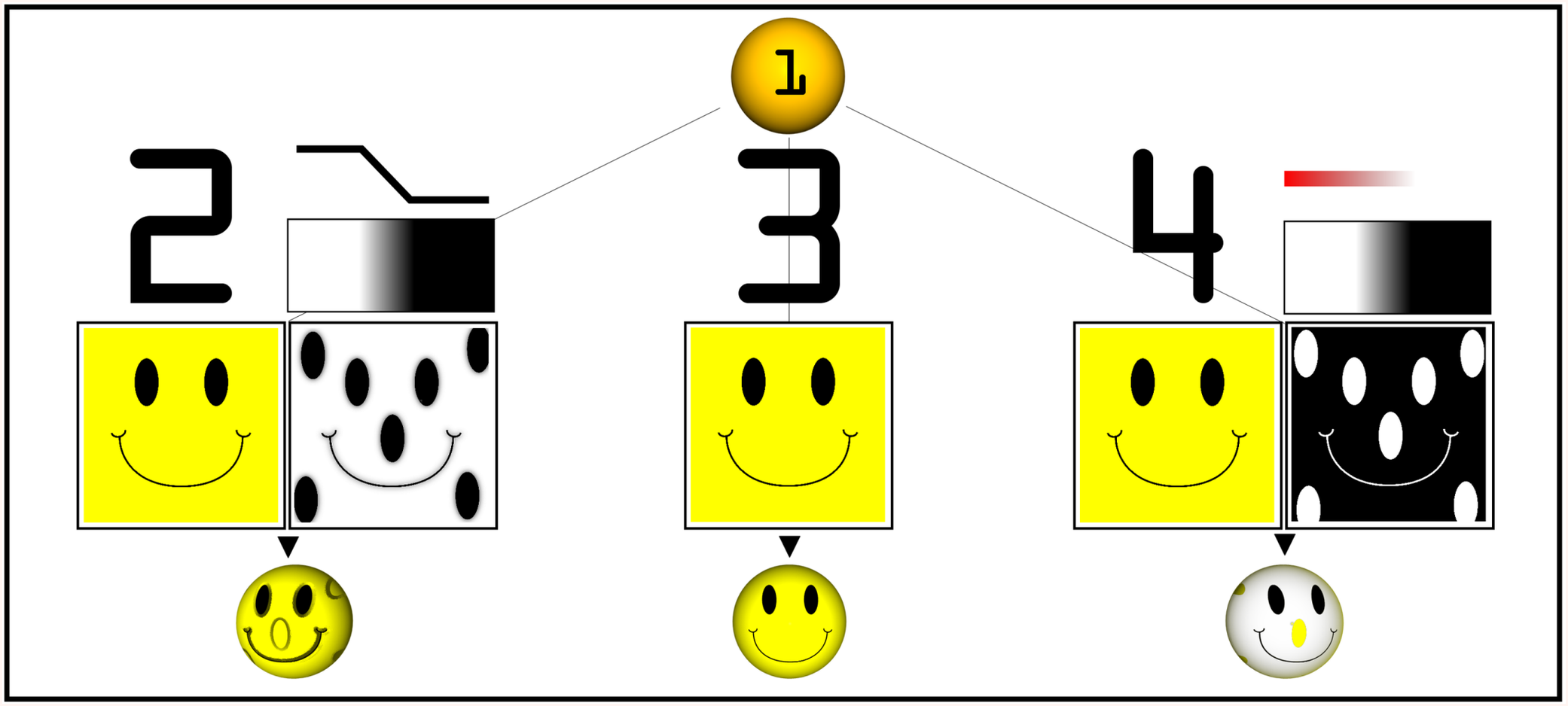
How To Add Texture?

~~Calculate?~~

Stick it on!

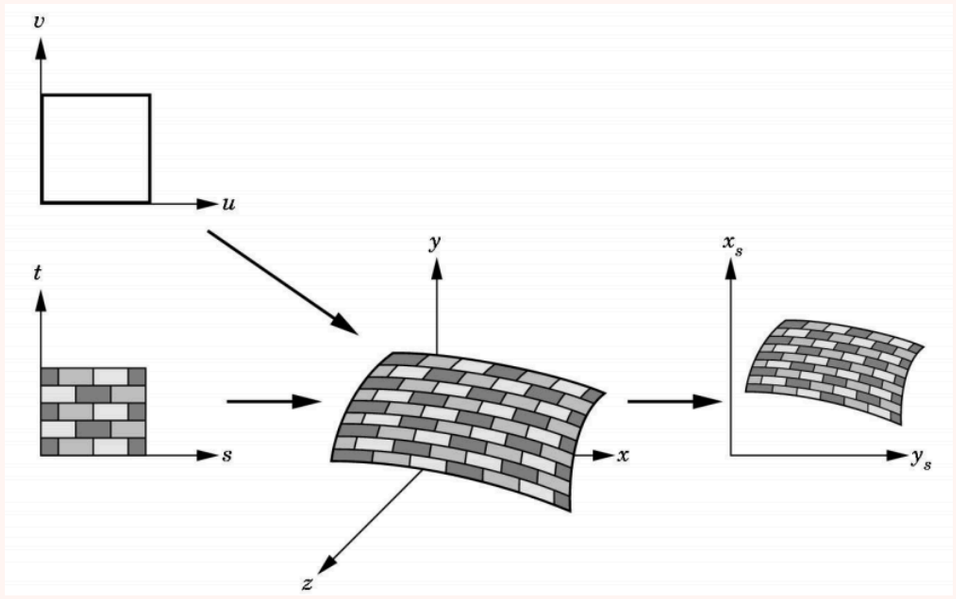


WHY TEXTURE MAPPING



DEFINITION

- **Texture: A multidimensional image that is mapped to a multidimensional space.**
- **Texture Mapping: The source image (texture) is mapped onto a surface in 3-D object space, which is then mapped to the destination image (screen) by the viewing projection.**



HOW TO MAP

- Screen Scanning(drawing)
- Texture Scanning(pasting)
- Two Pass Scanning(spraying)

```
SCREEN SCANNING:
    for y
        for x
            compute u(x,y) and v(x,y)
            copy TEX[u,v] to SCR[x,y]

TEXTURE SCANNING:
    for v
        for u
            compute x(u,v) and y(u,v)
            copy TEX[u,v] to SCR[x,y]

TWO-PASS:
    for v
        for u
            compute x(u,v)
            copy TEX[u,v] to TEMP[x,v]
    for x
        for v
            compute y(x,v)
            copy TEMP[x,v] to SCR[x,y]
```

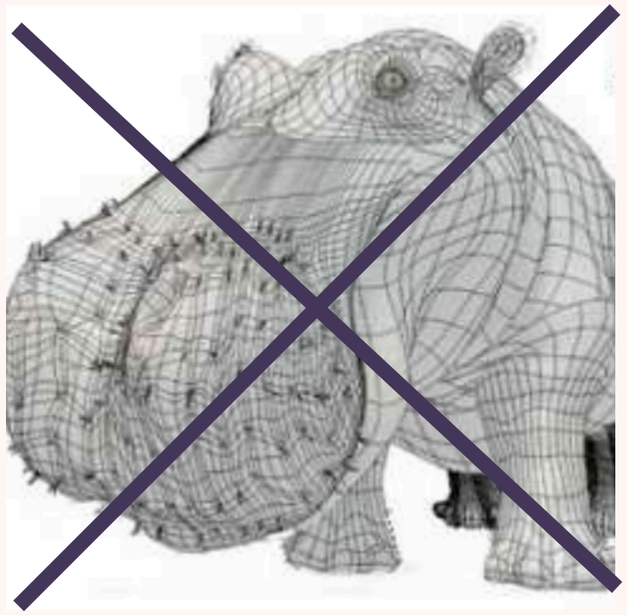
WHAT'S THE PROBLEM

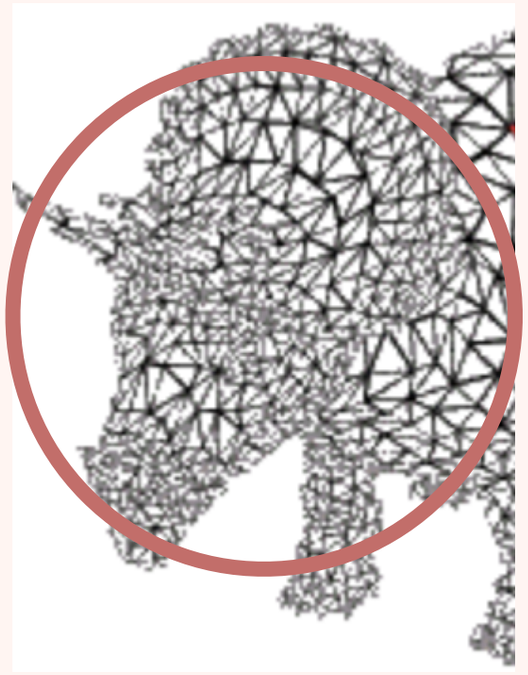
- **Drawing – Complecated(Inverse Mapping)**
- **Pasting – Holes & Overlaps**
- **Two Pass – All Good, Just for Affine and Perspective mappings**

WHY TWO PASS WORK

Patches and Subdivision

[Cat74] Ed Catmull, *A Subdivision Algorithm for Computer Display of Curved Surfaces*, PhD thesis, Dept. of CS, U. of Utah, Dec. 1974.





OTHER ADVANTAGES

- **Work Particularly Well For Affine and Perspective Mappings**
- **Amenable to Stream Processing Techniques(Pixar Pipeline)**

THANKS