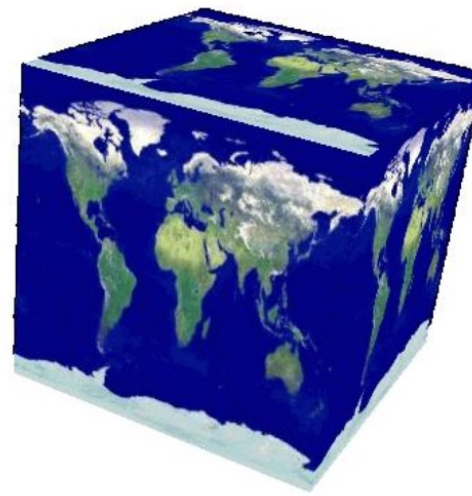
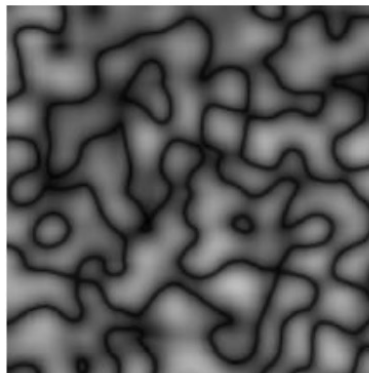
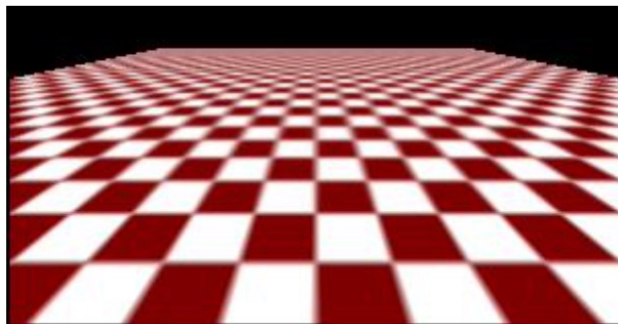


# 12 – texture mapping

# Texture Mapping



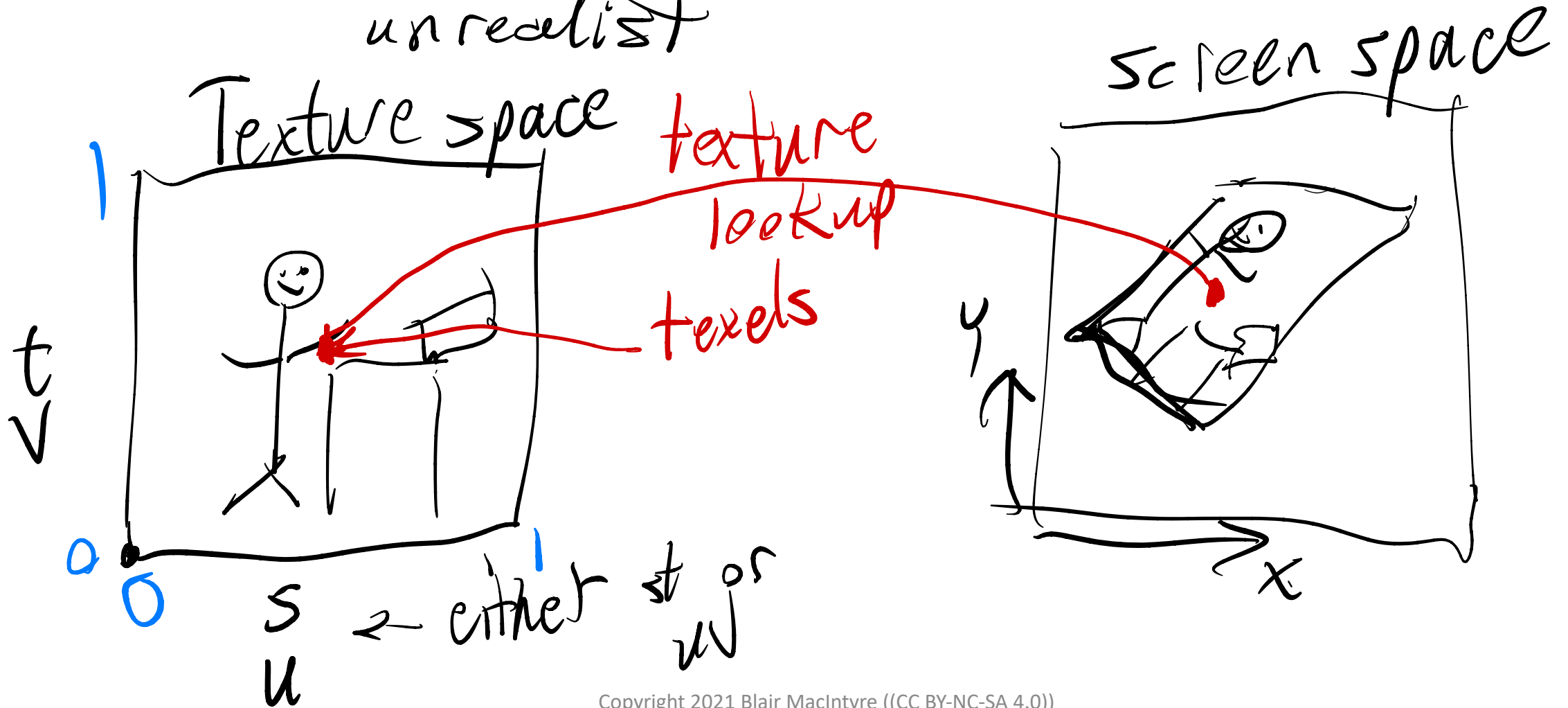
- A way of adding surface details
- Two ways can achieve the goal:
  - ❖ Surface detail polygons: create extra polygons to model object details
    - ❖ Add scene complexity and thus slow down the graphics rendering speed
    - ❖ Some fine features are hard to model!
  - ✓ Map a texture to the surface (a more popular approach)

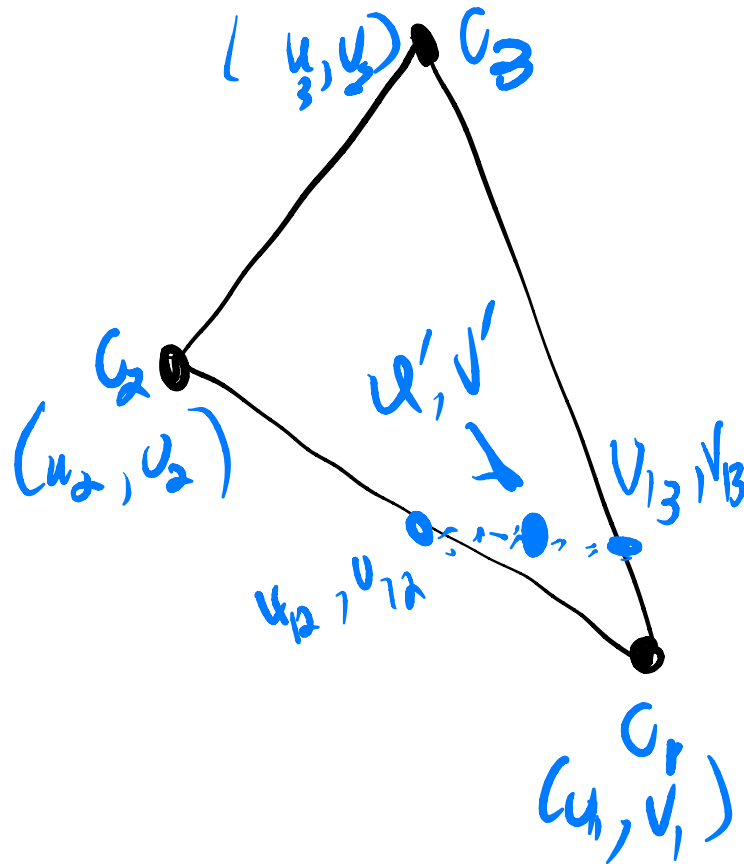
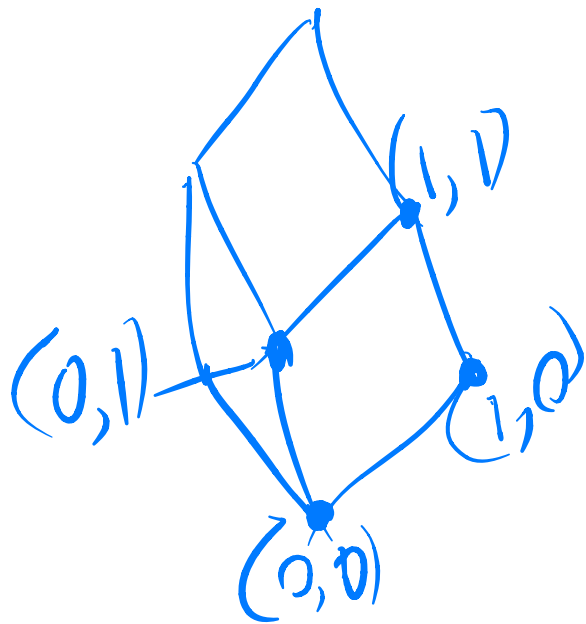


Complexity of images does  
Not affect the complexity  
Of geometry processing  
(transformation, clipping...)

$O_d$  was  
diffuse  
color  
↓  
"look up"  
"O<sub>d</sub>" per  
pixel  
from  
texture

Texture - providing color that varies surface  
realistic (wood, marble)  
unrealist



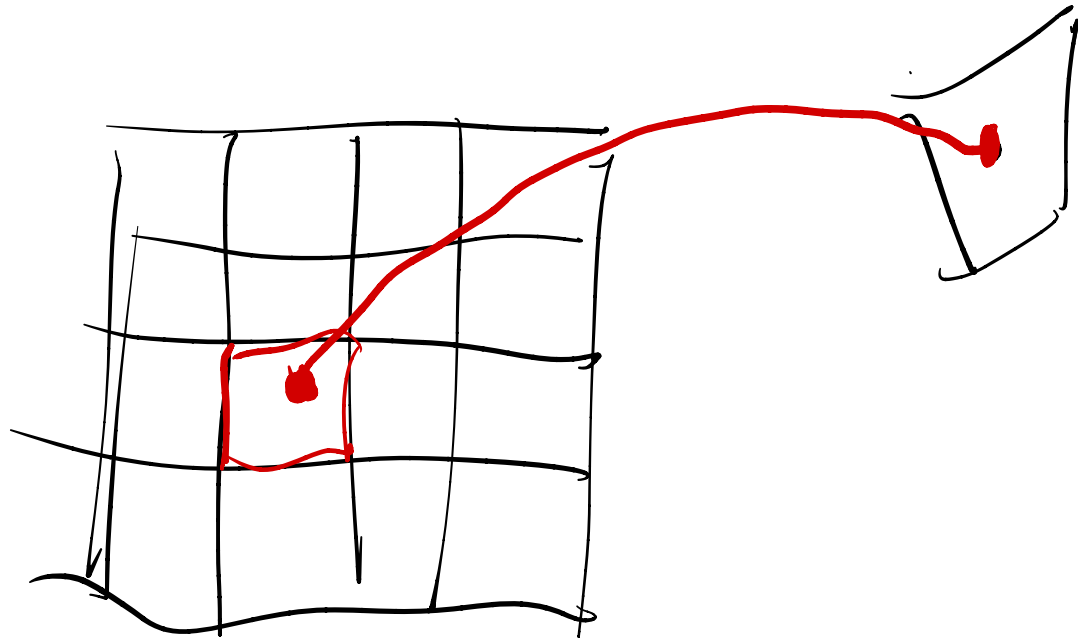


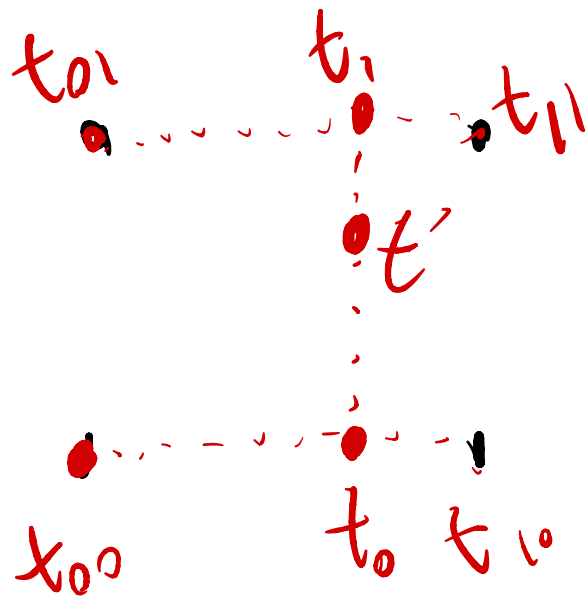
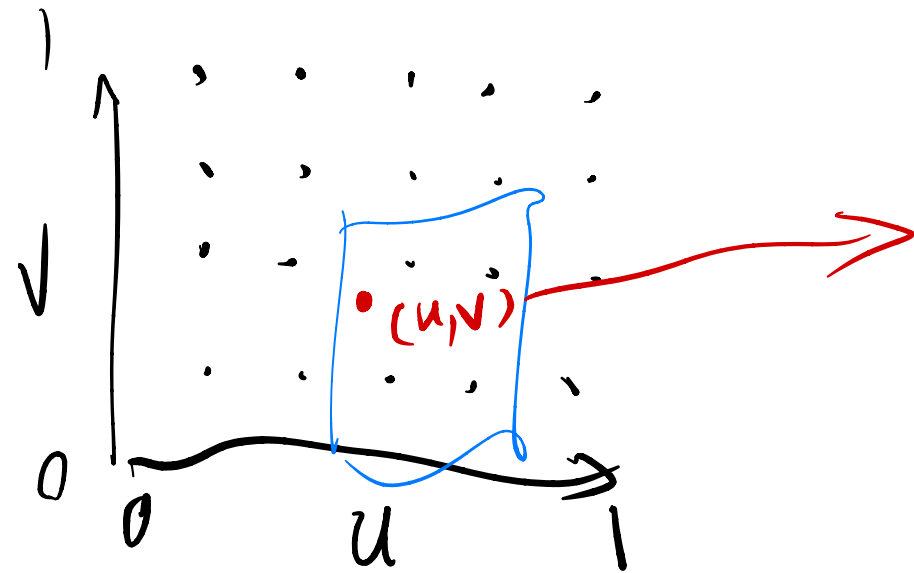


$$x' = \frac{x}{|z|} \quad y' = \frac{y}{|z|} \quad z' = \frac{1}{|z|}$$

- 1) divider  $u$  &  $v$  by  $|z|$  to get  $u'$ ,  $v'$
- 2) interpolate  $u'$ ,  $v'$
- 3) divide by  $z'$  per pixel to set  $(u, v)$  back
- 4) perform texture look

Texture are images  $\Rightarrow$  discrete set of texels





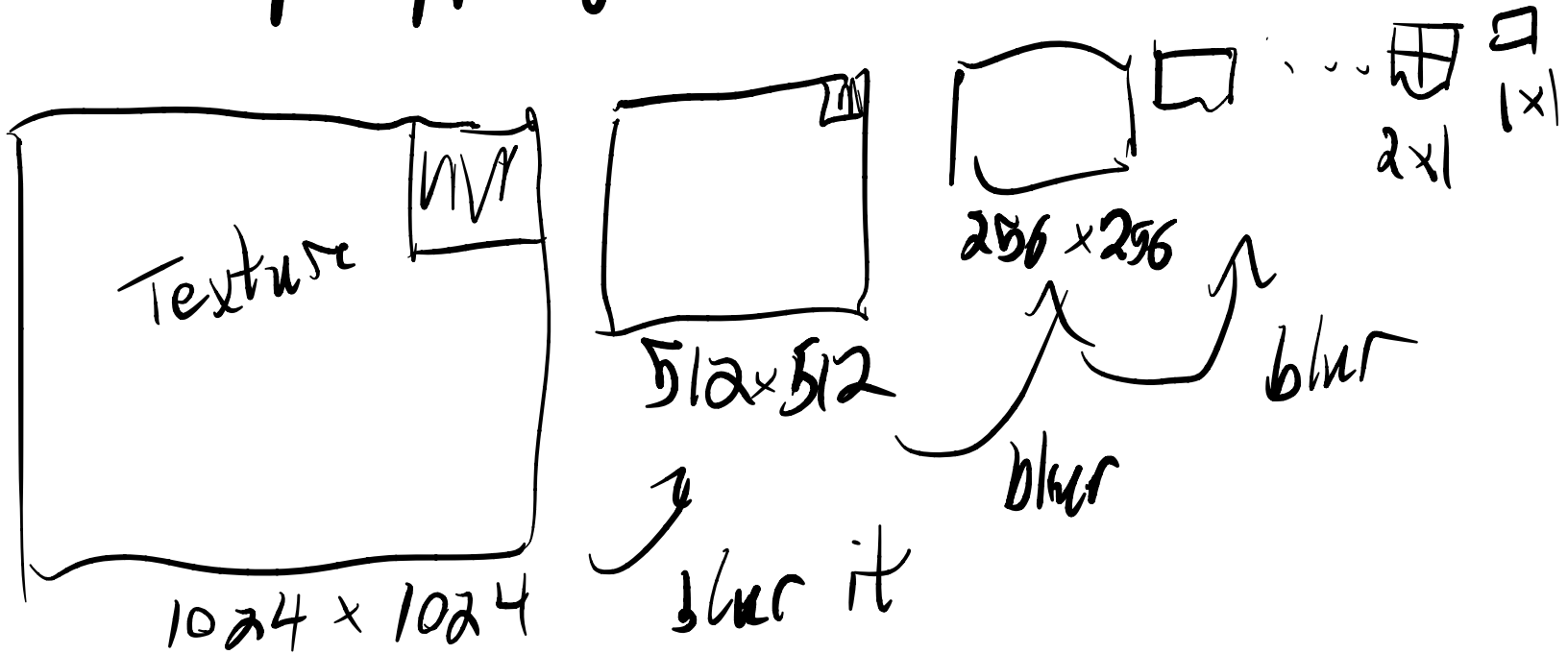
bilinear interpolation

# Texture Minification

## Mipmapping

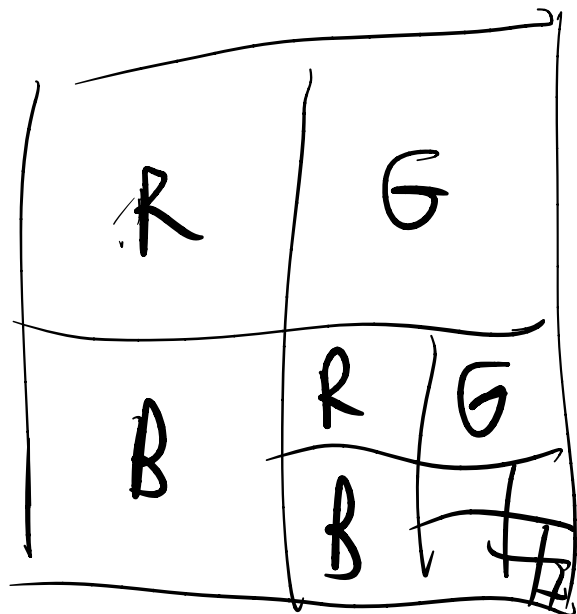
(MIPMAPS)

Image Pyramids



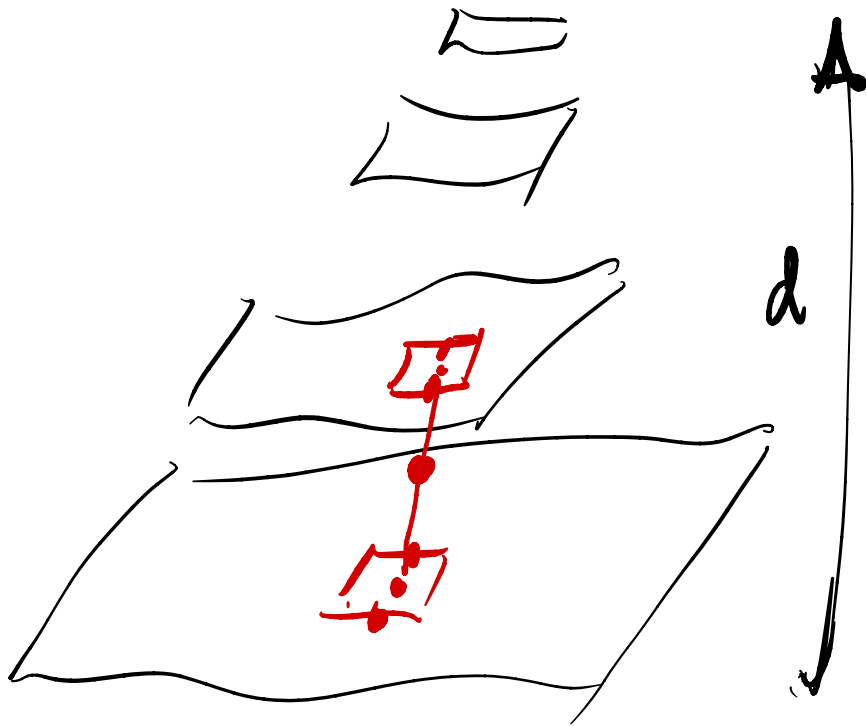


Storage?



2048 x 2048

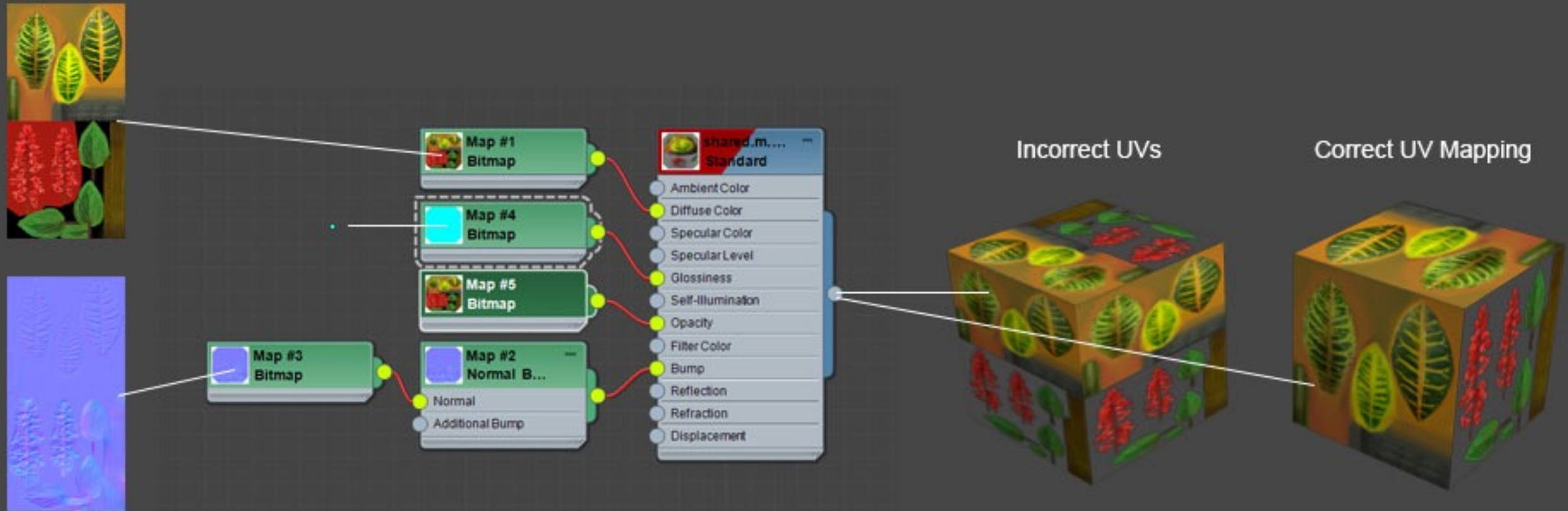
$\frac{1}{3}$  more



# Examples

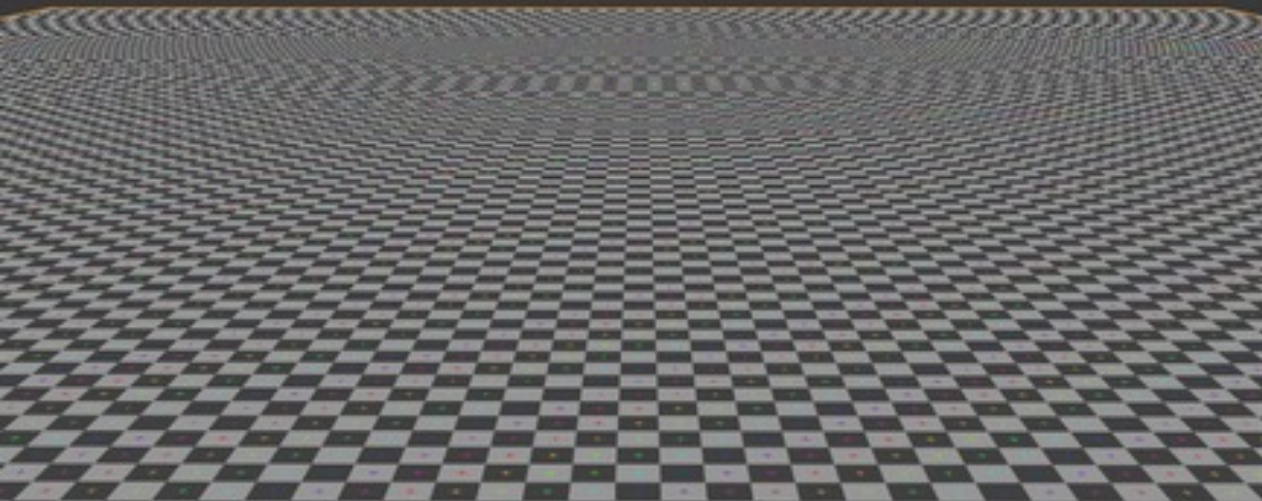
Look at [threejsfundamentals.org](https://threejsfundamentals.org)

use more space where need more detail

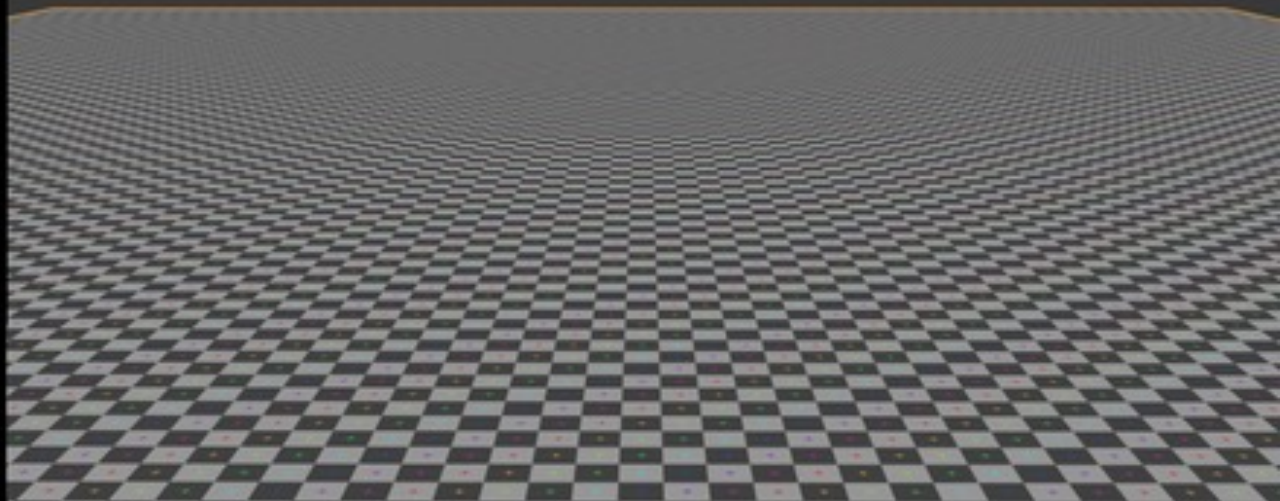


# MIPMAP examples

No MipMapping



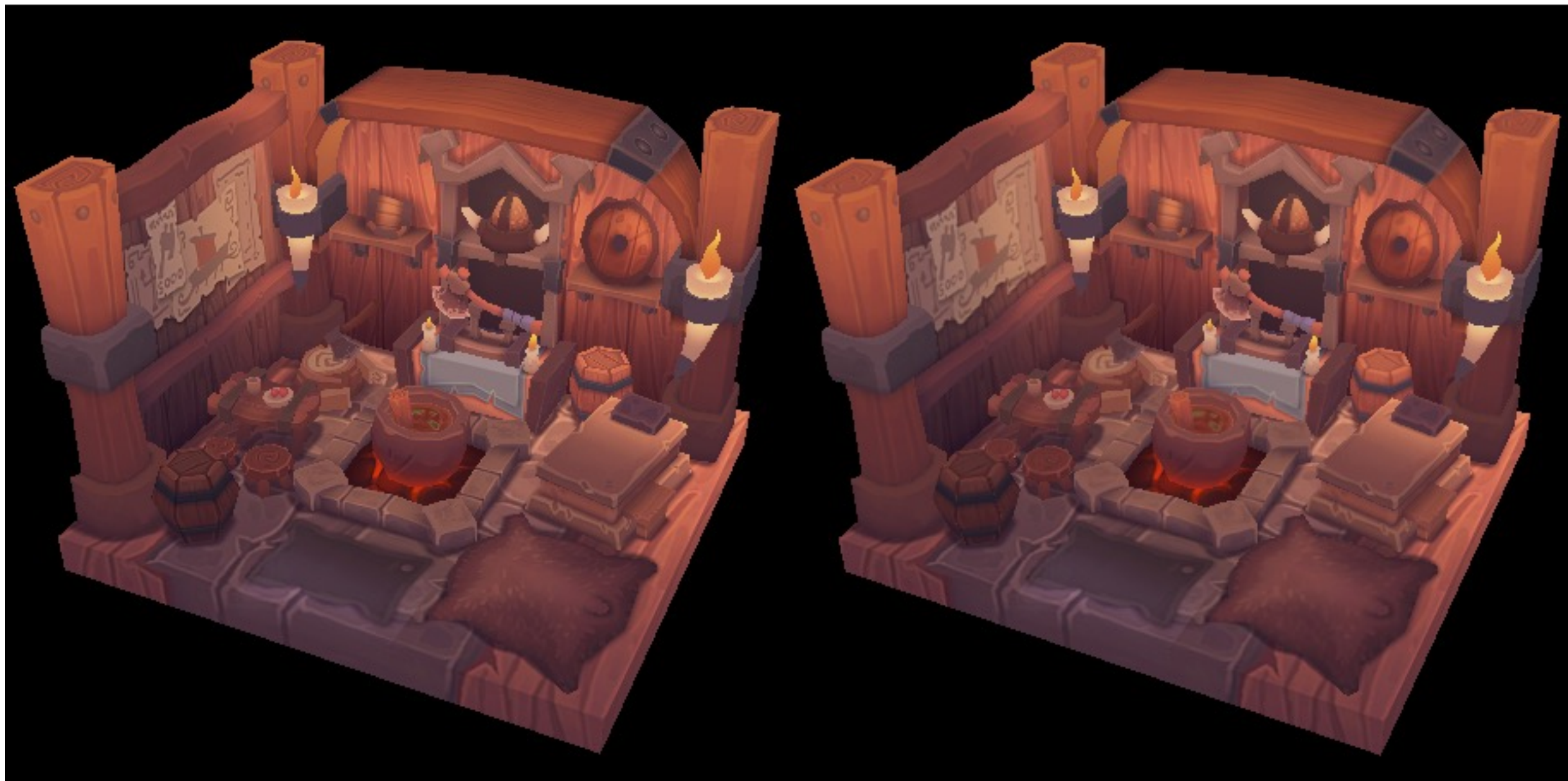
With MipMapping



<https://www.wikiwand.com/en/Mipmap>

Without mipmaps

With mipmaps



Without mipmaps



With mipmaps

