viscomp.2

Why

do we need shadows?

“You can only come to the morning through the shadows”…

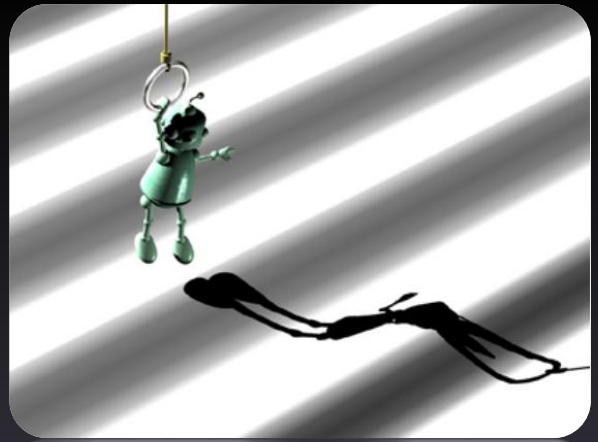
HOW high is the tennis player?

how?

what?

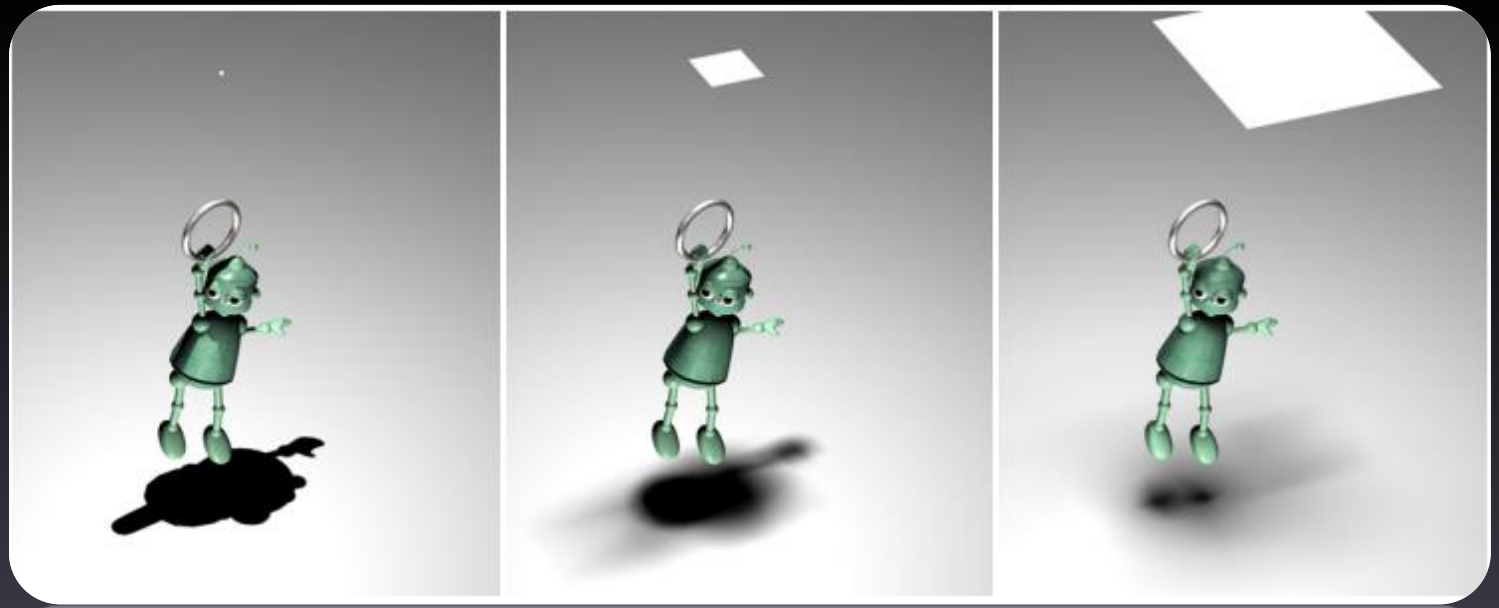
wich?

geometry of the occluder



shape of the receiver

relative objects positions



light position and shape

How high is the tennis player?

real world has shadows!

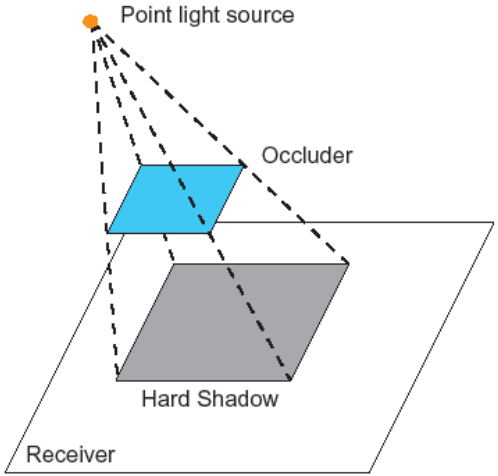
$$I\lambda = K_{a\lambda} I_a + \sum_{p=0}^{Nluces} S_i I_{p\lambda i} \left[K_{d\lambda} (\vec{n} \cdot \vec{l}) + K_{s\lambda} (\vec{r} \cdot \vec{v}) \right]$$

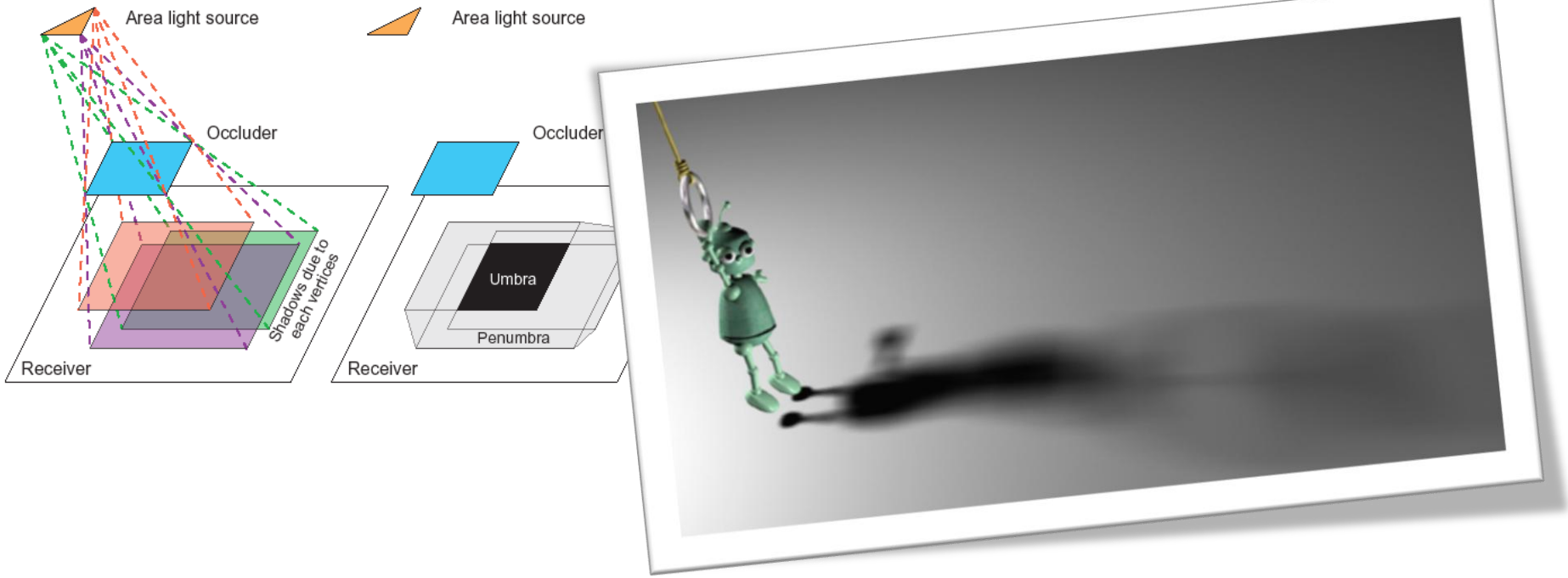
S_i

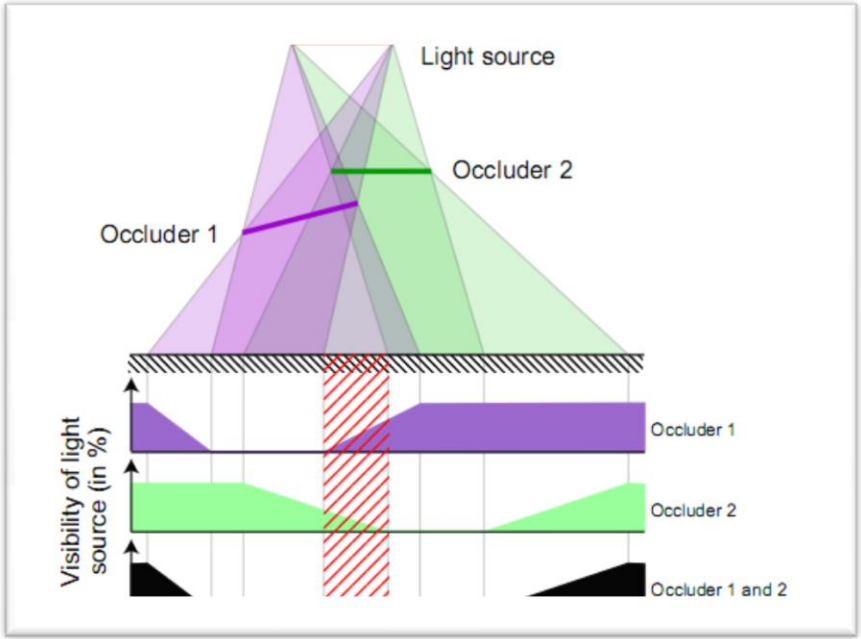
= 0 → light blocked

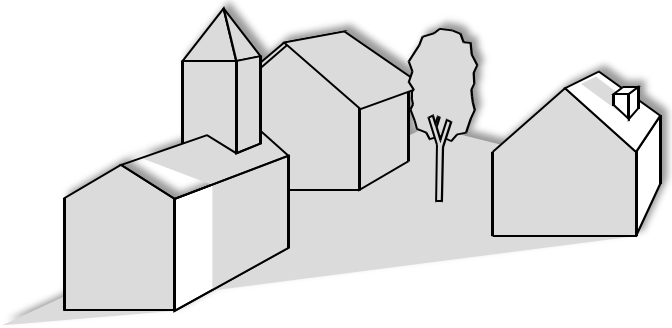
= 1 → light not blocked

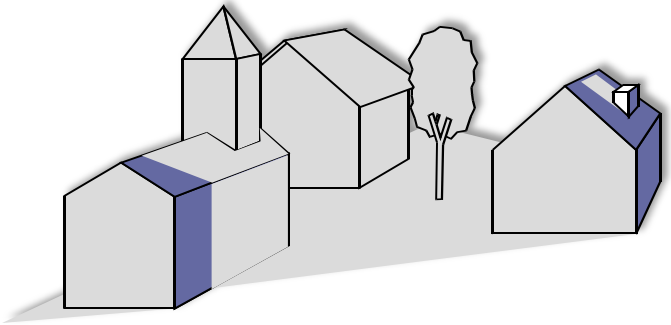
but…


Point light source
Occluder
Hard Shadow
Receiver


Area light source
Occluder
Shadows due to each vertices
Receiver
Area light source
Occluder
Umbra
Penumbra
Receiver


Light source
Occluder 2
Occluder 1
Visibility of light source (in %)
Occluder 1
Occluder 2
Occluder 1 and 2





computing a hard shadow, and extending it to compute a soft shadow.

1

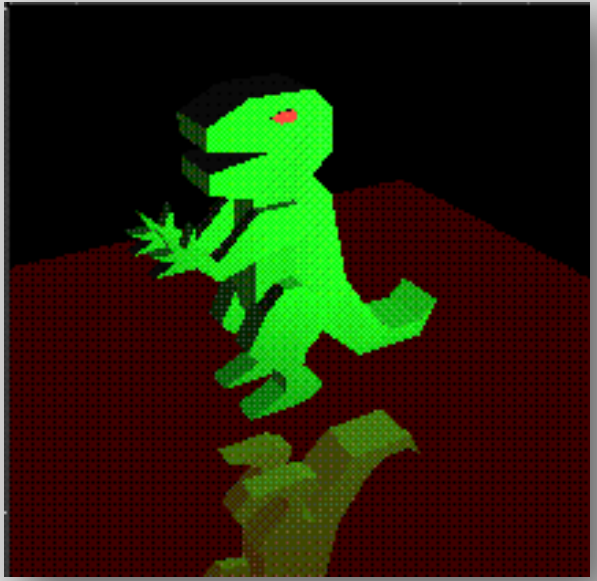
4

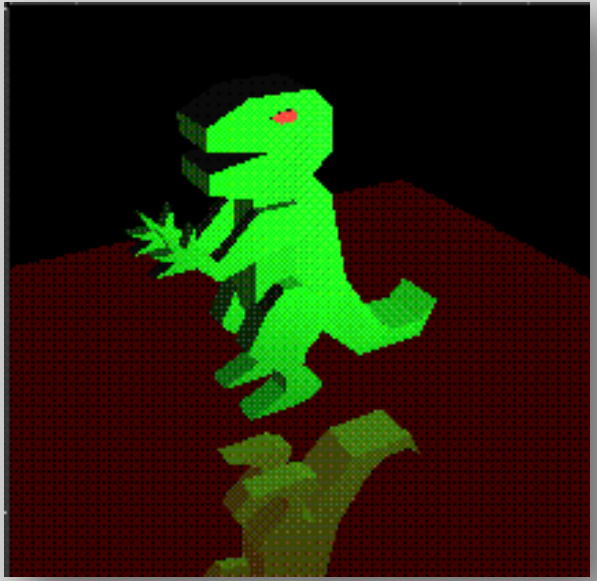
64

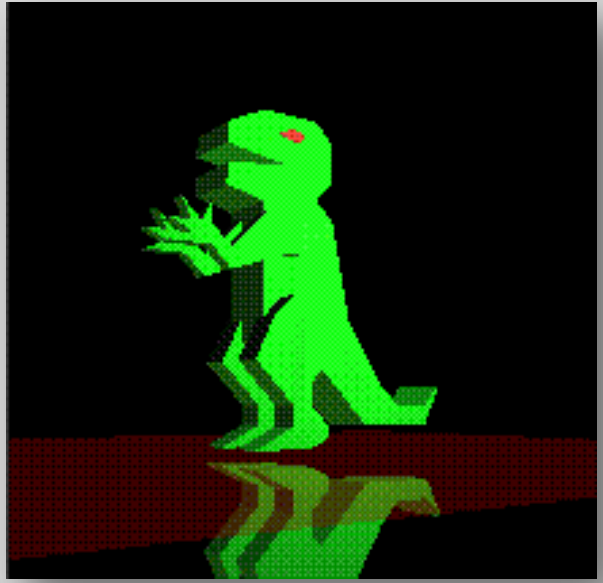
techniques

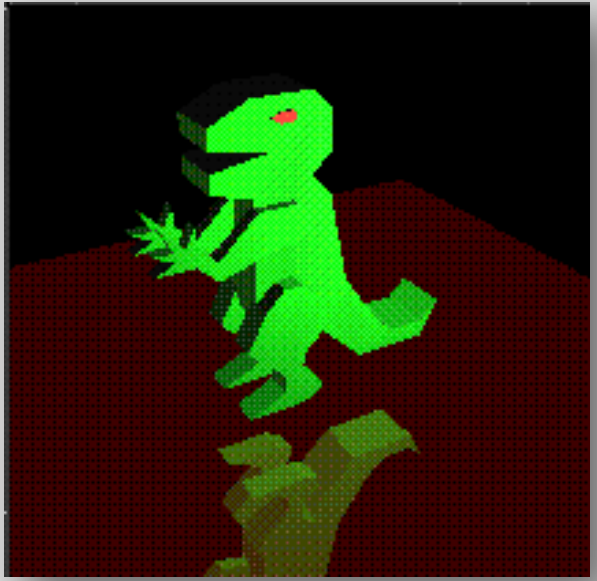
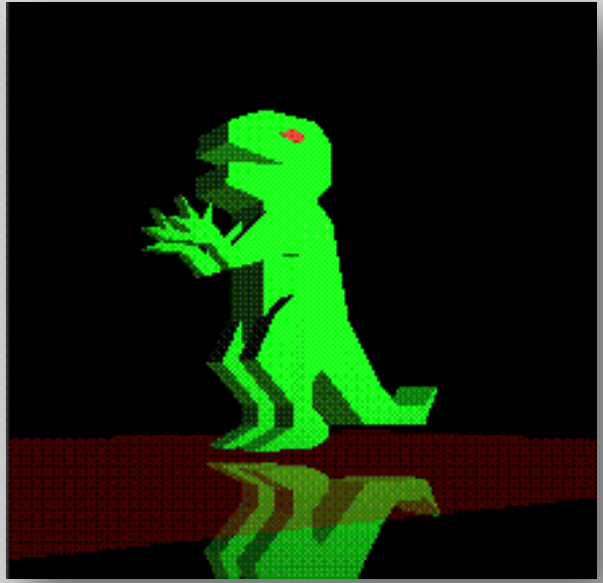
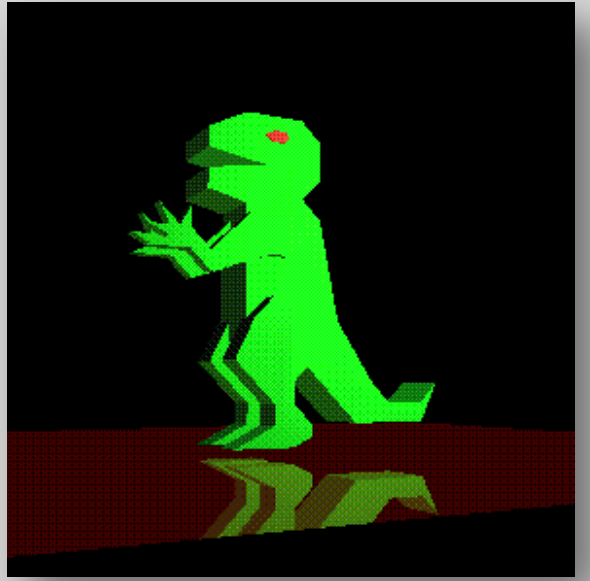
JUST DO IT.

MY CAR
AppGamer.net

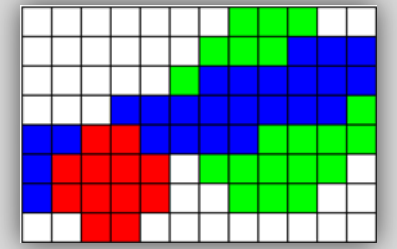


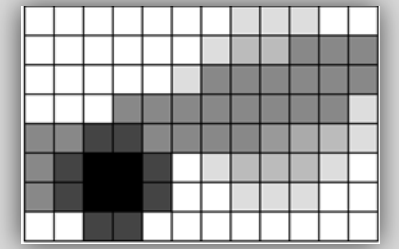


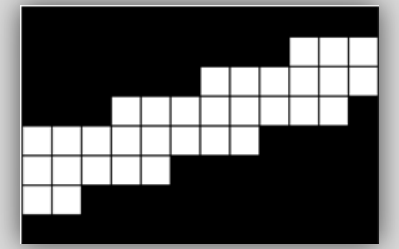


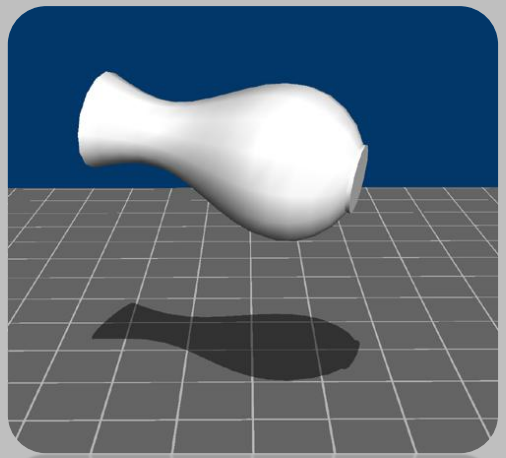




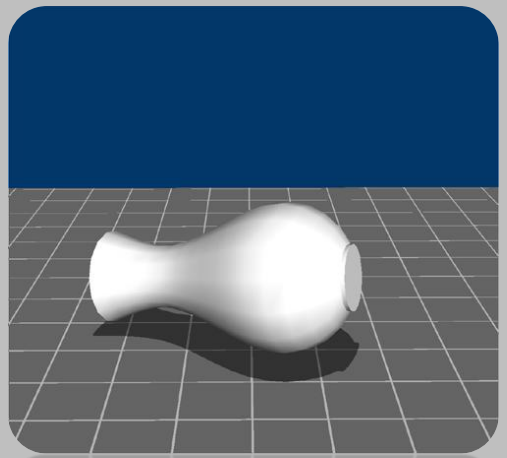
METAL

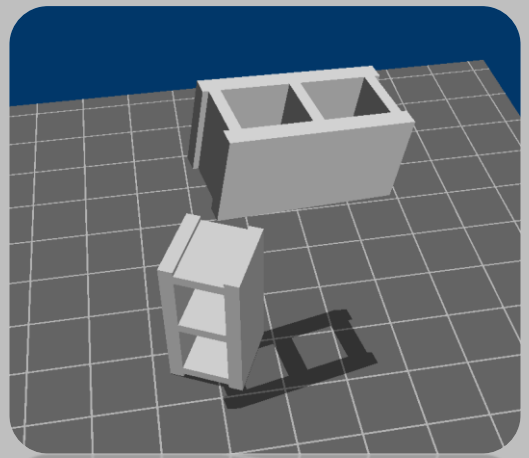












Identifying

the parts of the scene that are hidden from the light source

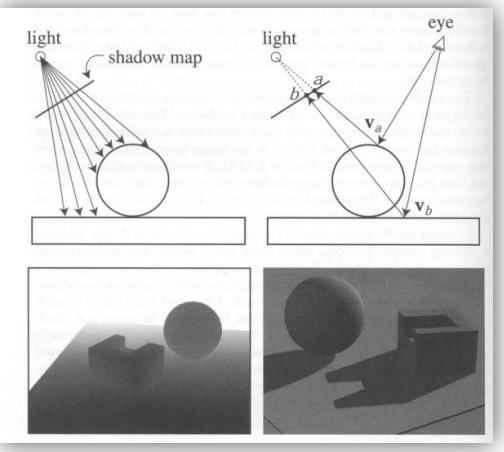
and then… the visual part

1978

shadow mapping

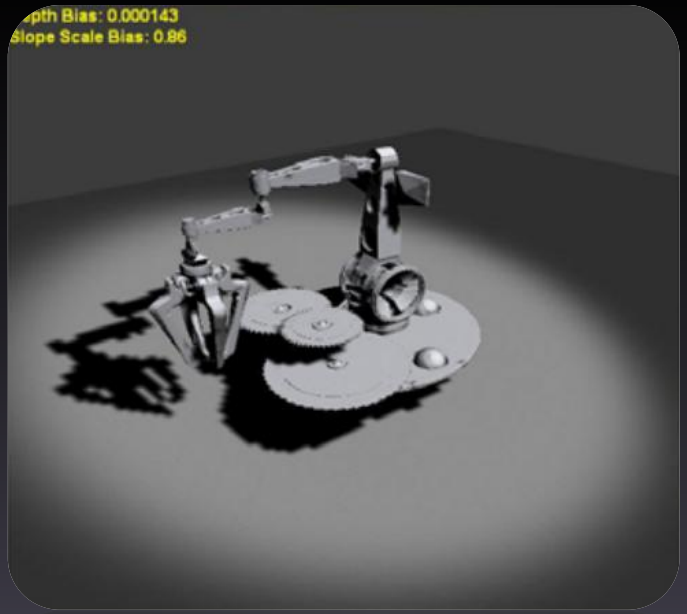
Render the scene, (point-of-view of the light)

Store the z values

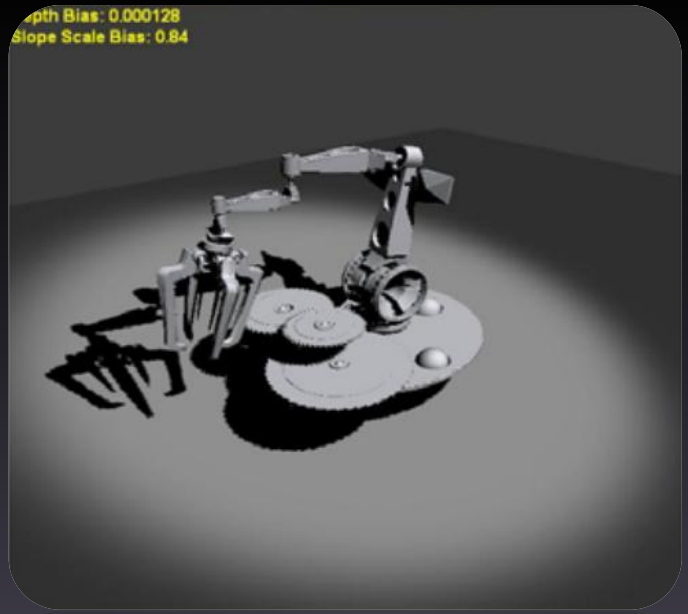


Render the scene (normal point-of-view) checking…

```
Calculate (x’,y’,z’)LS
zL:=ShadowMap(x’,y’);
if zL<z’then
          point in shadow
else
          point in light
```

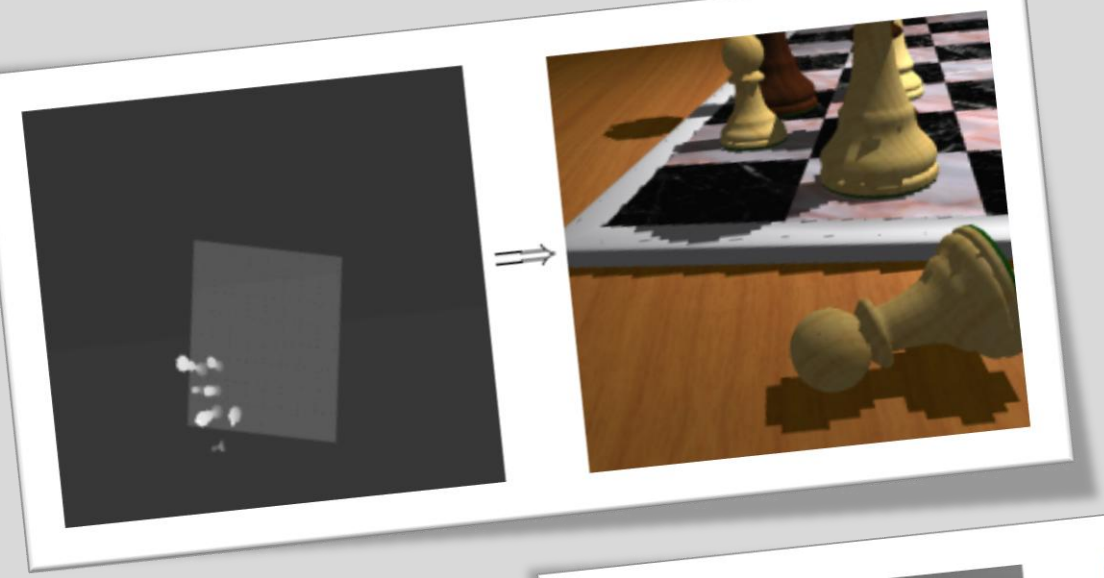


128

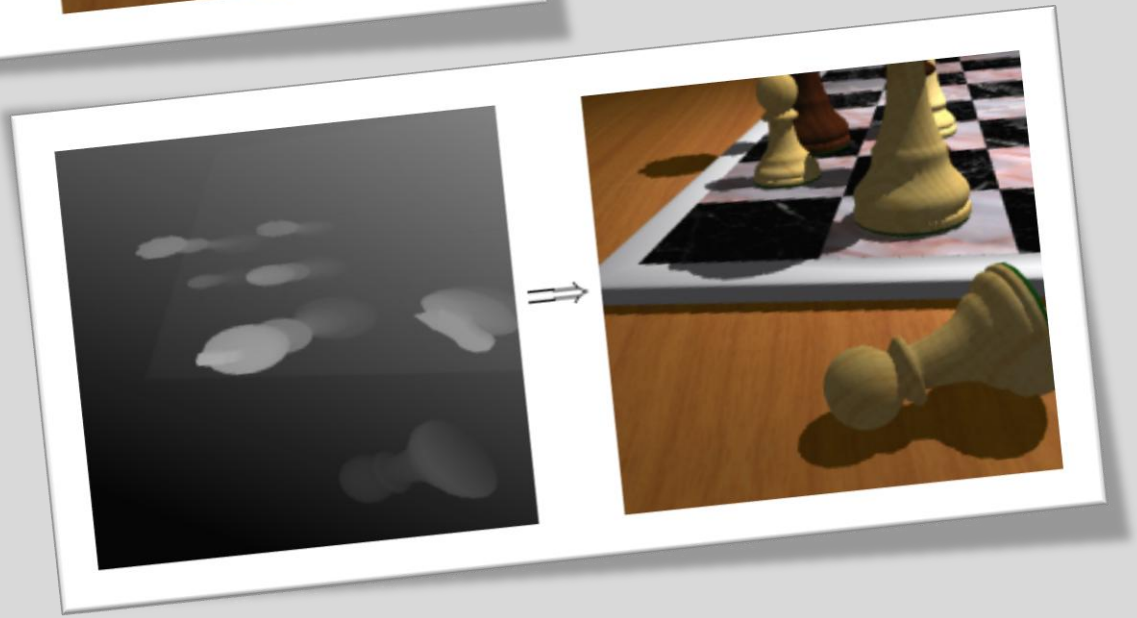


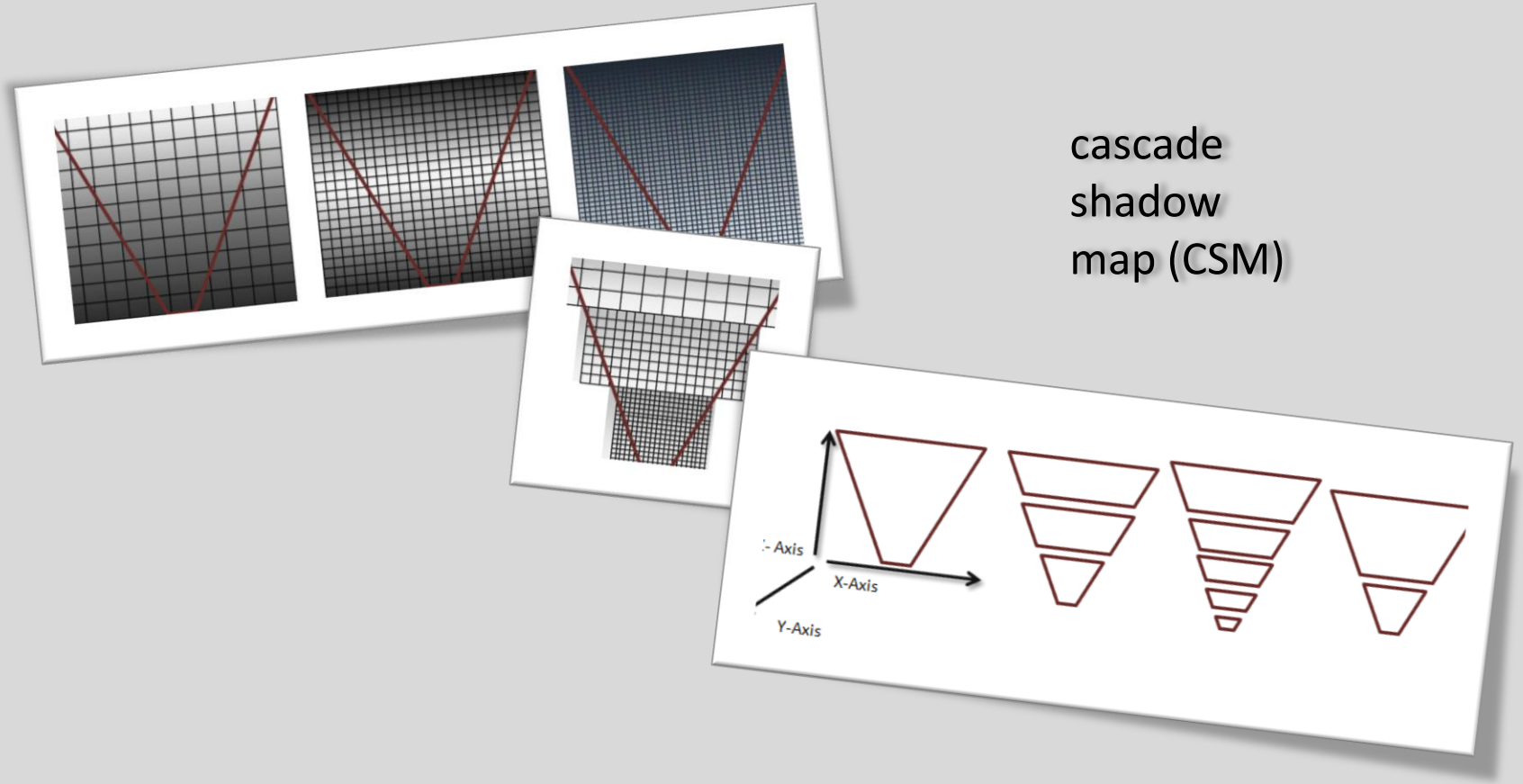
512

but… how many is enough?



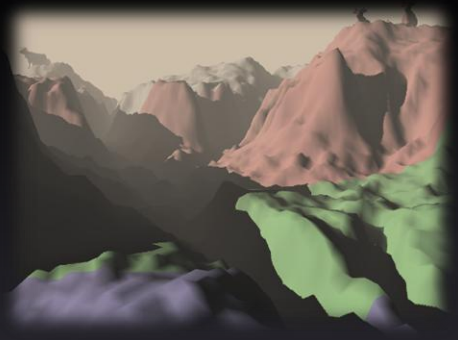
perspective
shadow
map (PSM)

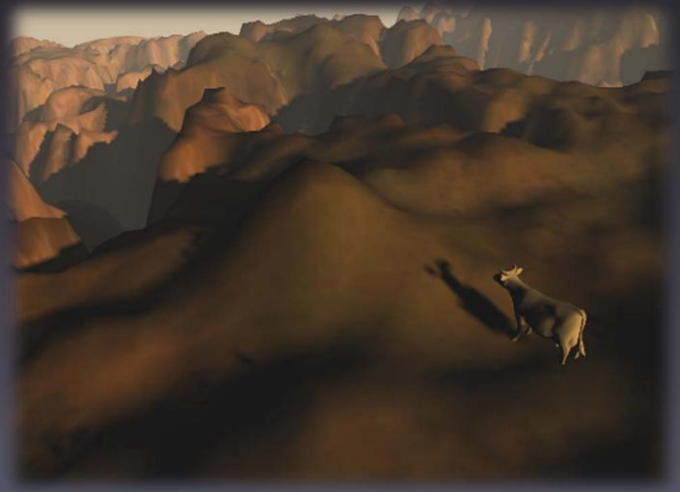




cascade
shadow
map (CSM)

splitting the camera view frustum and
creating a separate depth-map for each partition





Light Space Perspective Shadow Maps

Percentage Closer Filtering

Parallel-Split Shadow Maps

Trapezoidal Shadow Maps

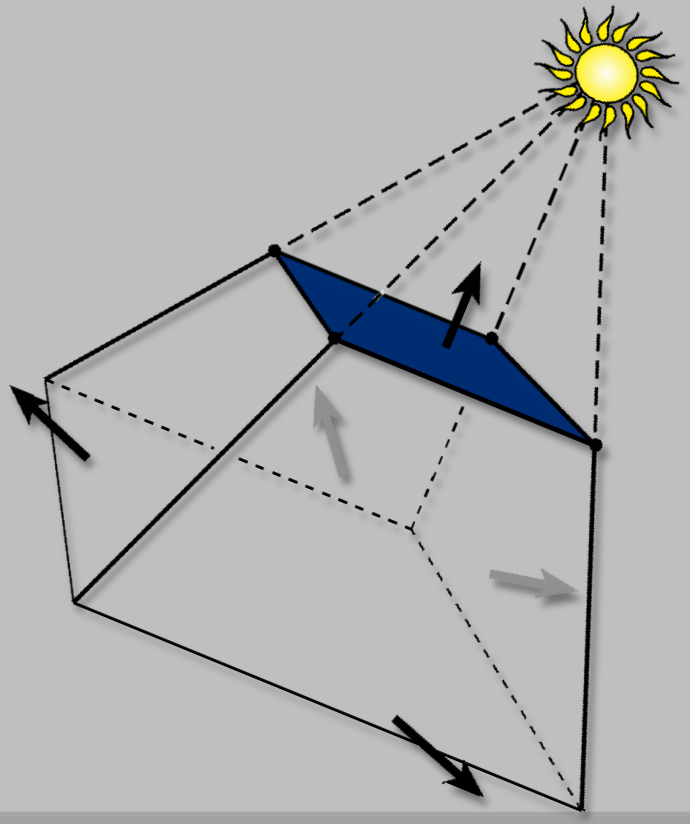
Variance Shadow Maps

id
TECH
5

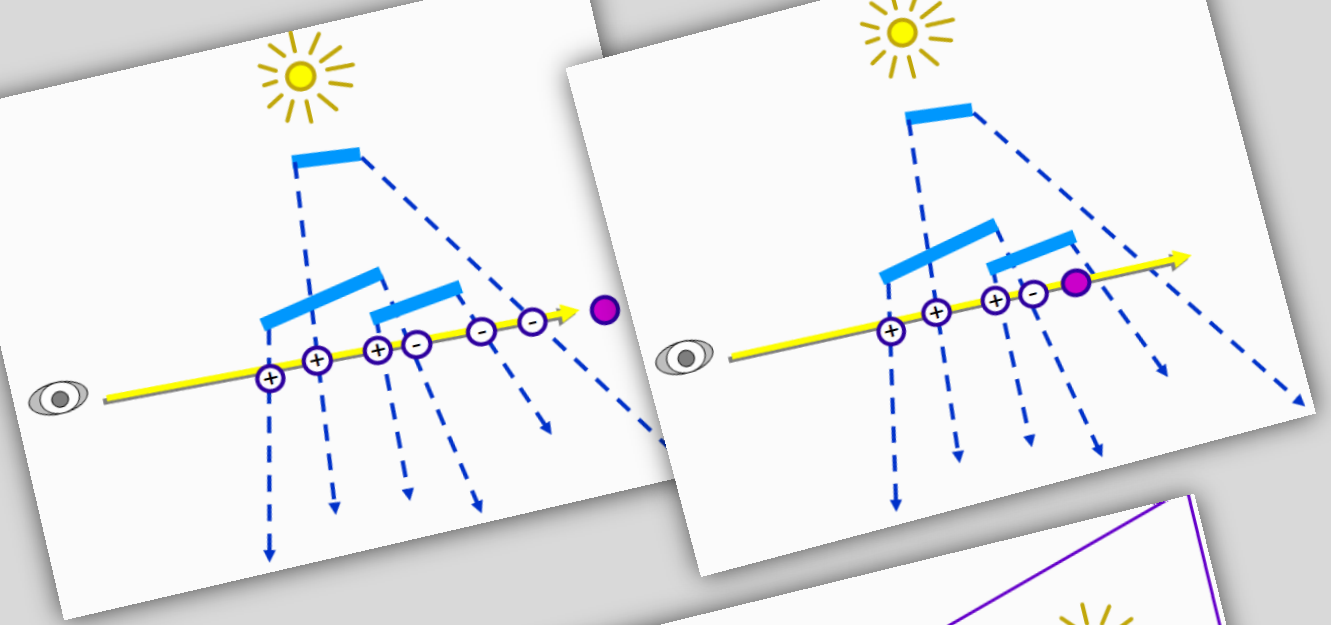
triangle blocking light

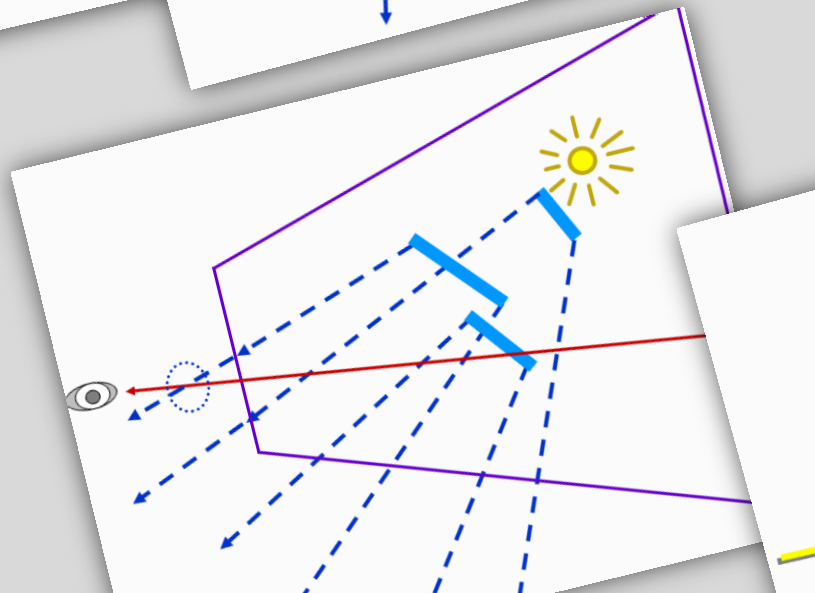
volume projected by triangle

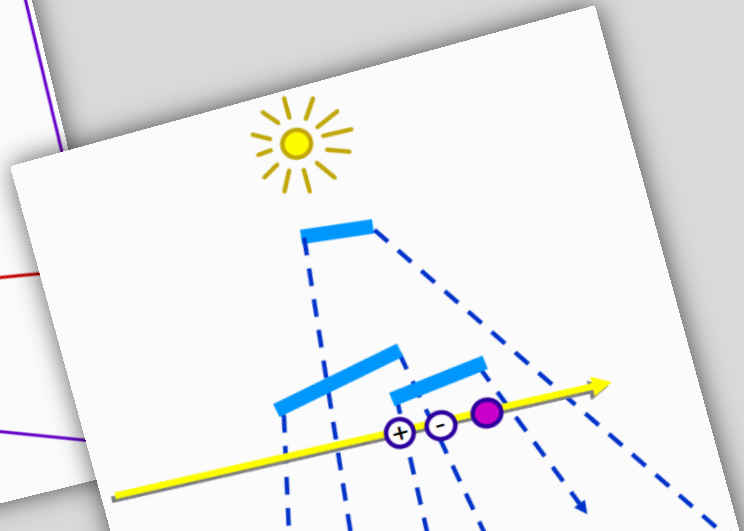
use stencil to check



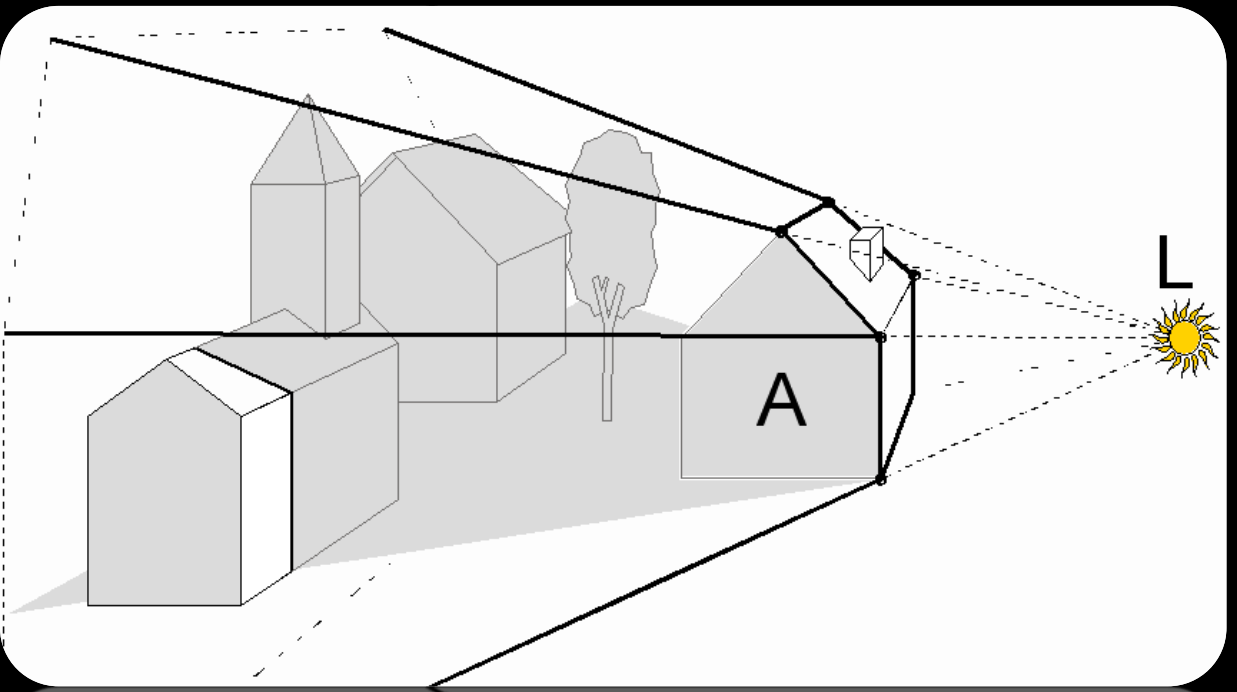
2 passes: light pixels outside volume; no lighting for pixels inside the volume.





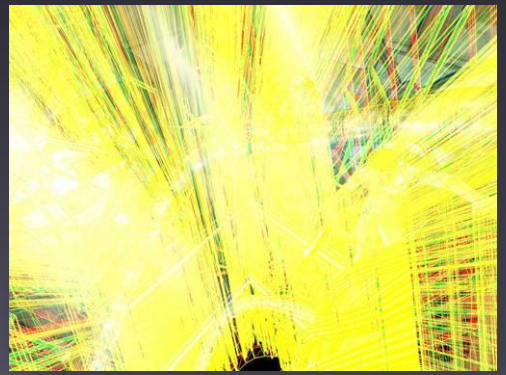


counting…



silhouette

shadow
geometry
madness



hibrid approach

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recipe
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