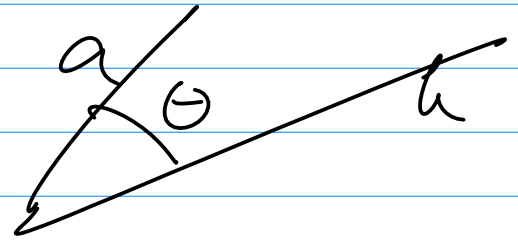


2 VECTORS a, b

$\theta = \text{ANGLE}$



$$\cos \theta = \frac{a \cdot b}{|a| |b|}$$

$$|a| = \sqrt{a_1^2 + a_2^2 + a_3^2}$$

$$a = (1, 0, 0) \quad b = (1, 2, 3)$$

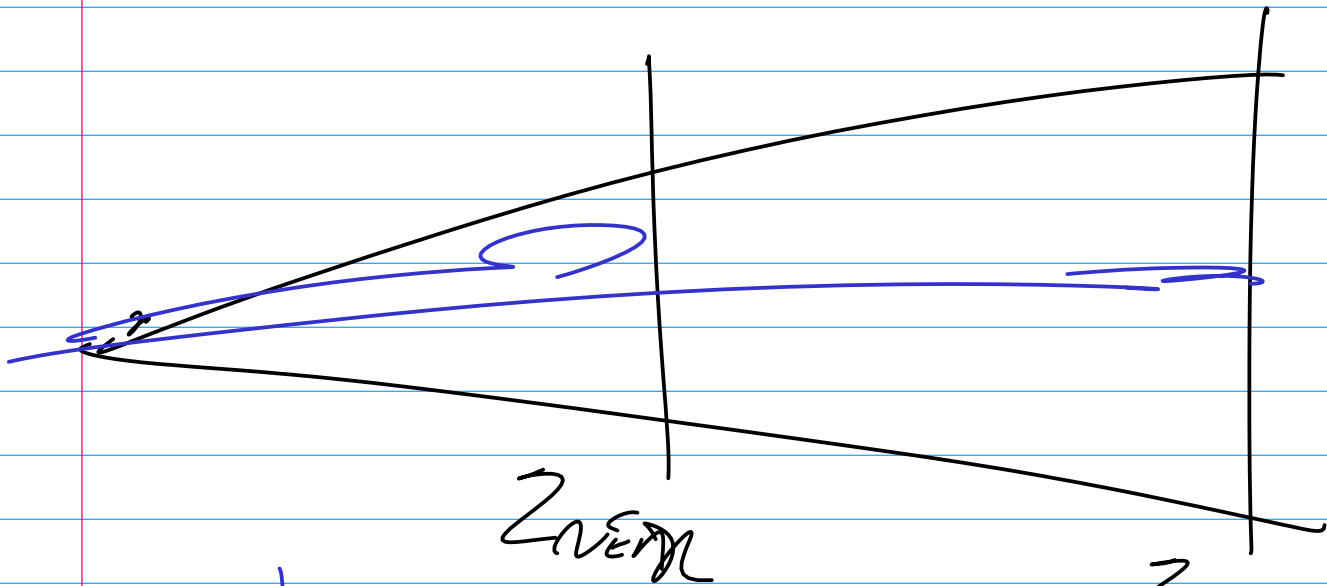
$$a \cdot b = 1$$

$$|a| = 1$$

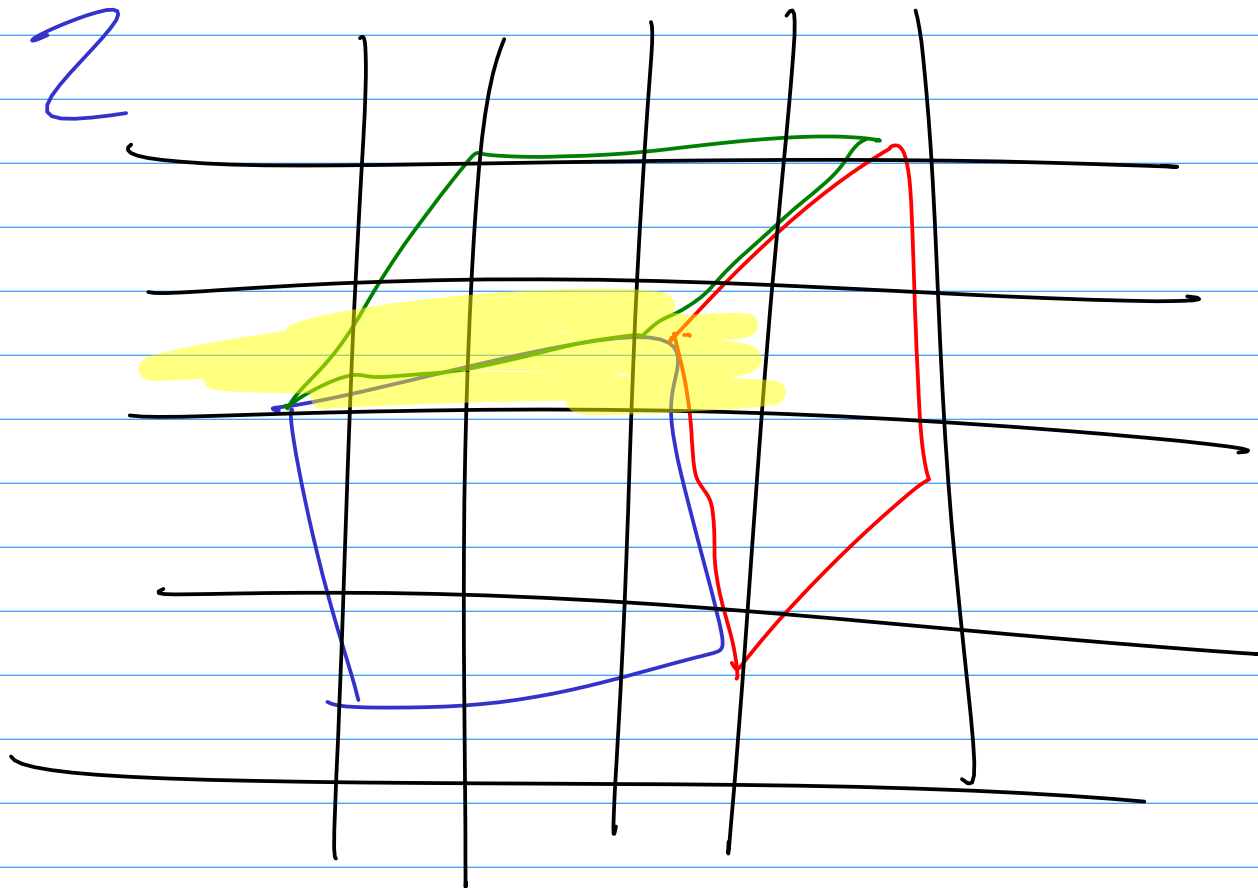
$$|b| = \sqrt{14}$$

$$\cos \theta = \frac{1}{1 \times \sqrt{14}} = \frac{1}{\sqrt{14}}$$

2



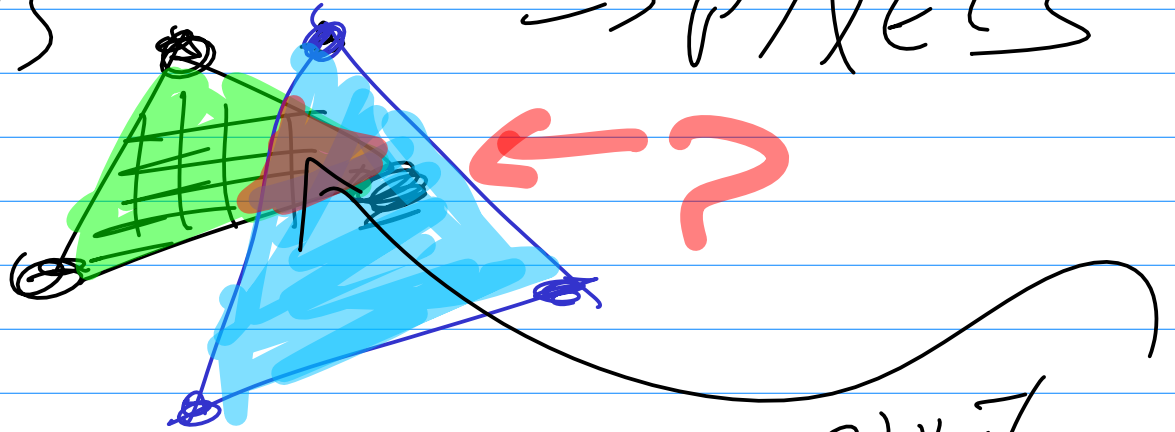
2



GRAPHICS PIPELINE

VERTS

→ PIXELS

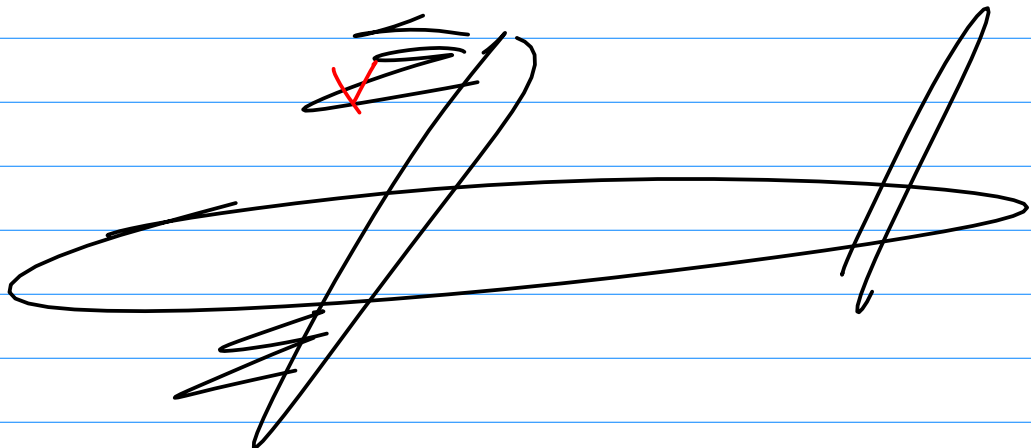


YOU JACK. THAT PIXEL

Q DESIGN API

WHAT SHOULD 'PICK'
ROUTINE RETURN?

A, = LINE OF CODE
of 1234.

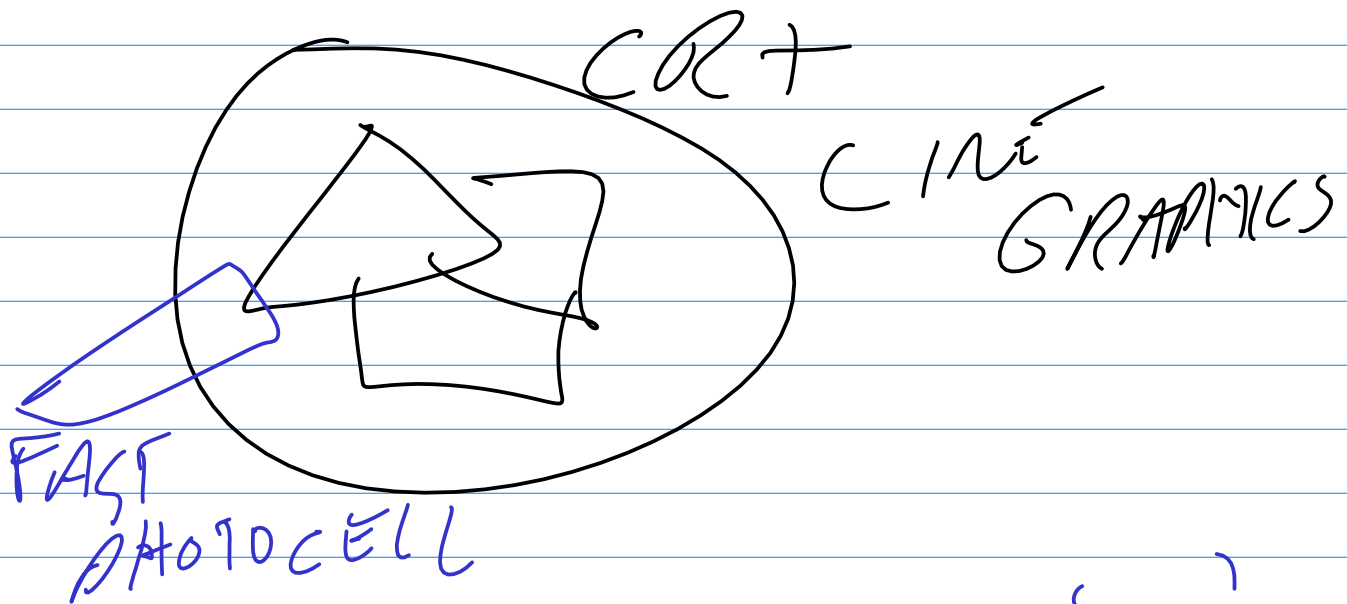


SOLN

4

YOU DECIDE WHAT'S
IMPORTANT IN OBJECTS.
YOU COLOR EACH DIFFERENT
OBJECT DIFFERENTLY.
TURN OFF LIGHTING.
TO PICK - READ PIXEL VALUE.

LIGHT PEN PICKING



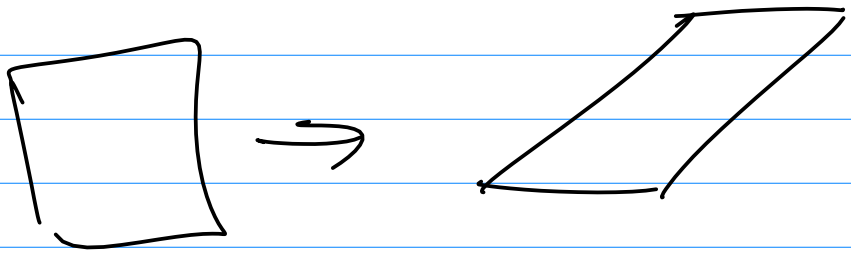
AS LINE IS DRAWN, AN 'ID'
REGISTER IS UPDATED
WHEN PHOTOCELL TRIGGERS, REGISTER COPIED.



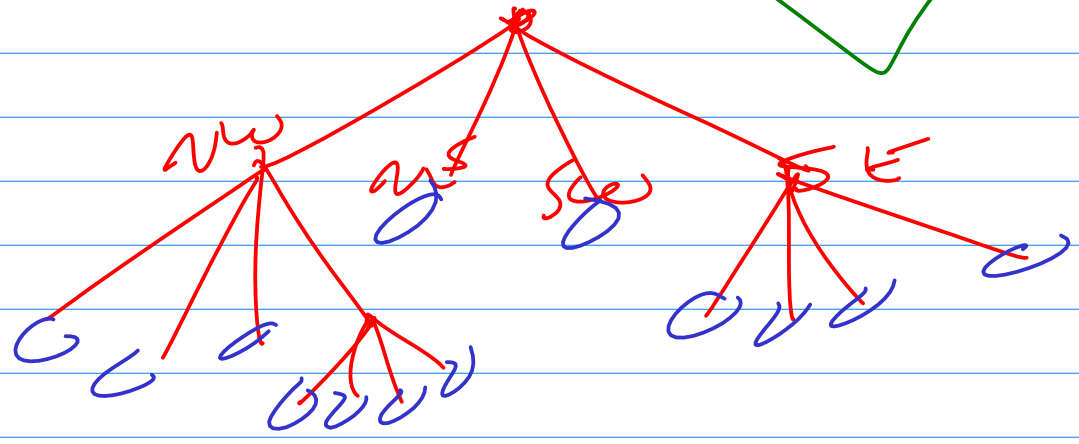
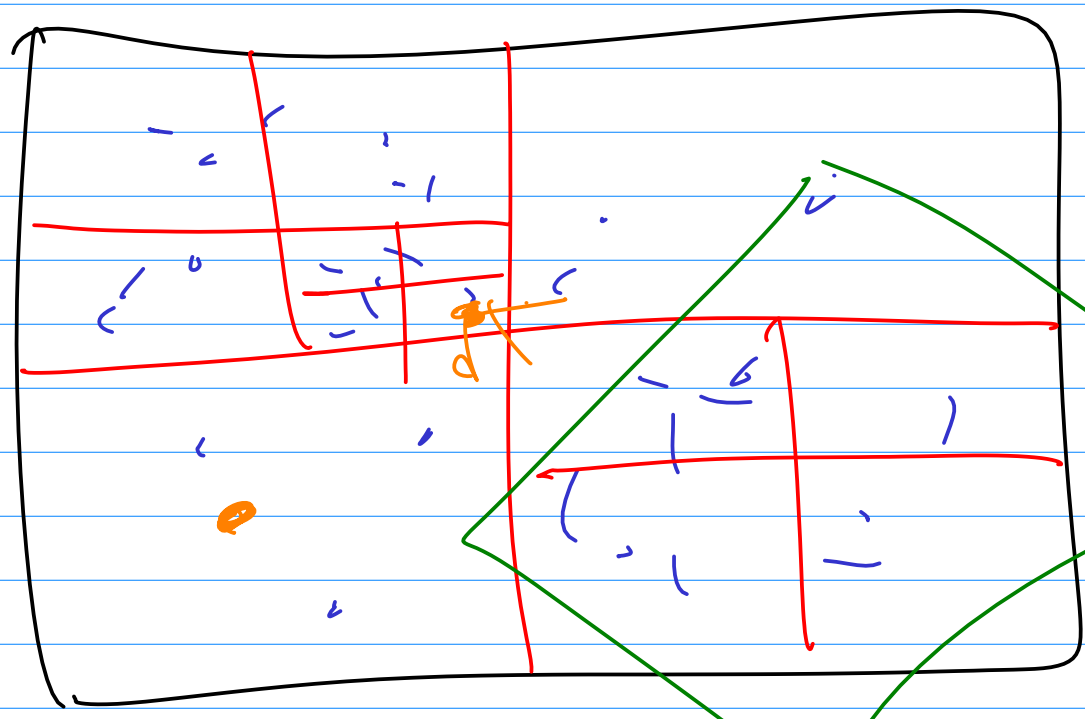
3M HYPOTHETICAL MACHINE.
WOULD IN FUTURE HAVE
1M B MEMORY TODAY
1 MIPS 128GB
1M PIXEL. 6TF
2M

PROBLEMS IS NOT UNIFORM

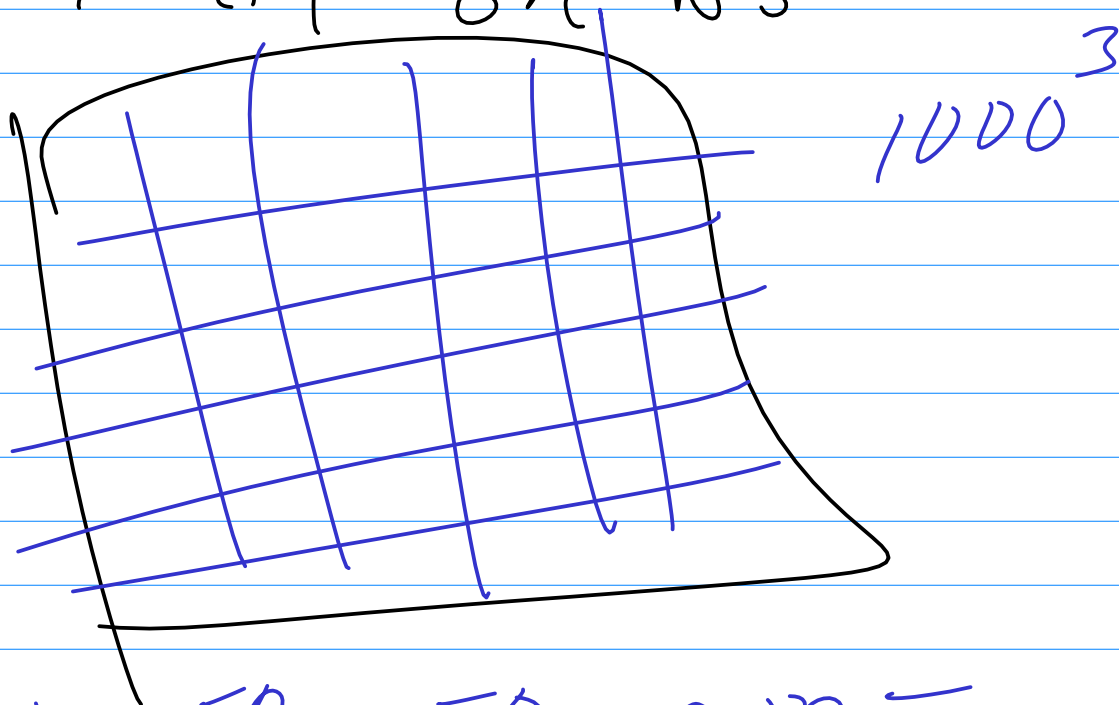
SHEAR



2D QUAD TREE



USE 1-LEVEL
'UNIFORM GRIDS'



- QUICKER TO CODE + OPTIMIZE + TUNE
- ACTUALLY IS FAST IF DONE PROPERLY
- PARALLELIZABLE

