Dynamic Textures

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The Mission

- Generate animated “dynamic” textures

The tools

- RenderMan
- vi

But any text editor can be used

That's it ?

- No C++ compiler ?
- No animation package ?
- No compositing tools ?

Yes, that's it !

- Not even rib file modifying. Just one rib file for the whole animation.

But why ?

- Why so many constraints ?

Why not !

- This is the Stupid RenderMan Tricks talk.
- Maybe you cannot program in C.
- You do not have the mentioned software.
- But the real reason is because...

But if you can program in SL you should probably learn

It's fun

- And a total waste of good programing resources...

Determinism

- RenderMan is a gigantic deterministic finite automaton (DFA).
- The same rib rendered over and over always generate the same picture

At least in theory. it is the goal

State

- The rib file contains all the information available to the render and shaders.

Including textures

- The only "state" changed by rendering are the images.

Output images that is.
Everything else is read-only

Feedback Loop

- Output: Arbitrary Output Variables
- Input: Textures
- Looping: Rib call “MakeTexture”

allow multiple writes

allow multiple reads

Convert an output image to an input texture. Can overwrite existing one. This is what feedback the data.

Feedback Loop in RIB

```
FrameBegin
...
Display “+lf.tif” “tiff” “varying color Clife”
Quantize “varying color Clife” 255 0 255 0
...
...
...
...
MakeTexture “lf.tif” “lf.tex” “clamp” “box” 1 1
“patern” “single”
FrameEnd
```

Access in SL

- Disable filtering when reading texture

What was written must be read exactly

- Use texture info

to get texture dimensions and handle frame 1 case

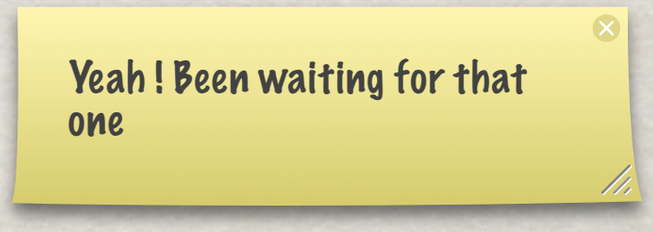
- Special case: frame 1

The texture does not exist yet

What is it good for?

- A shader can use the result of a previous render.

- A shader can use the result of itself at a different position than P.



- A frontplane shader can use this to create evolving texture.

PDEs

- No siggraph talk is complete without mentioning Partial Differential Equations

- Diffusion-Reaction : $\partial a/\partial t = F(a,b) + G(a,b)\nabla^2 a$

Diffusion-Reaction

The initial distribution is chosen at random using cellnoise.

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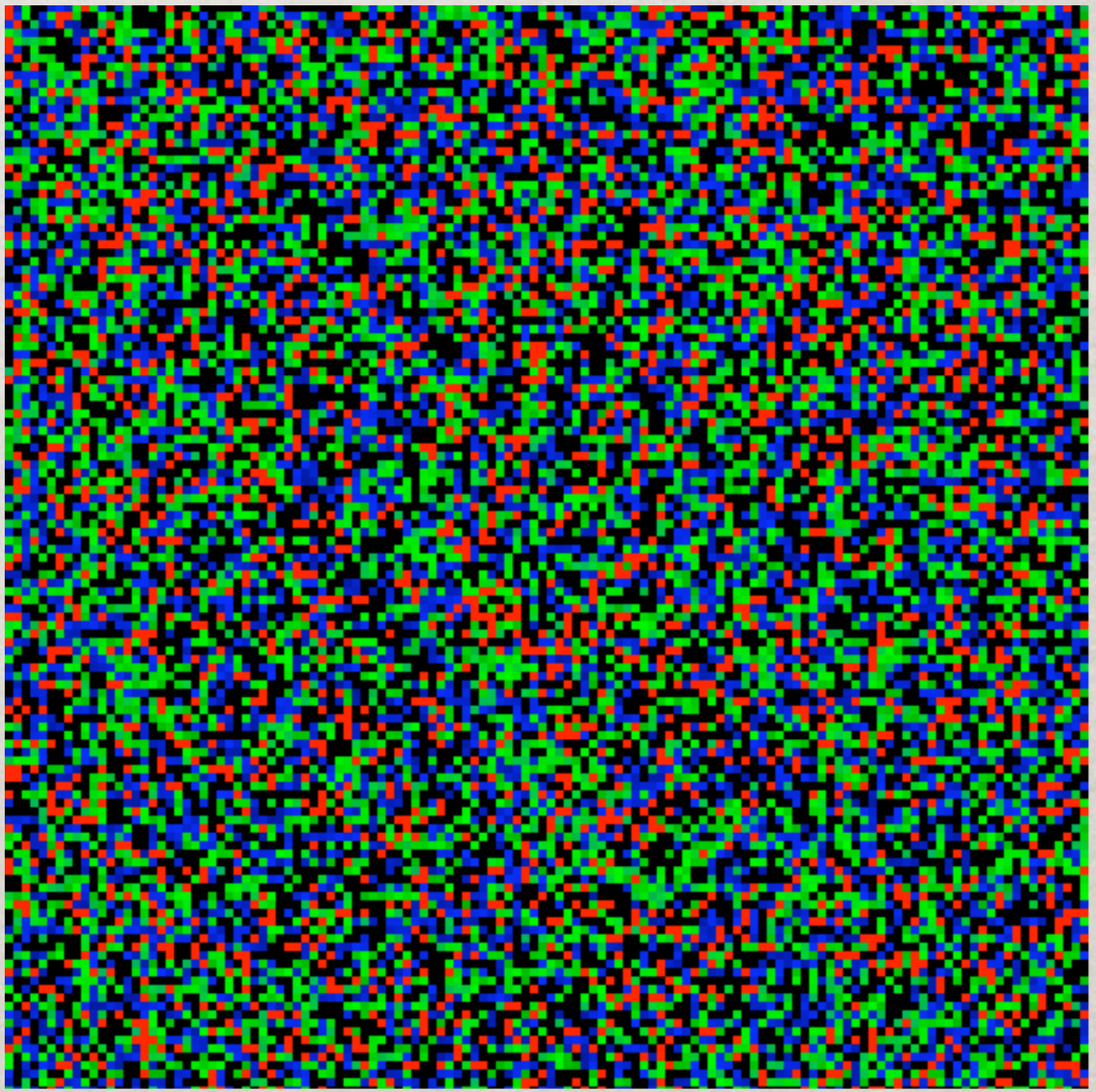

Diffusion-Reaction

- After tweaks

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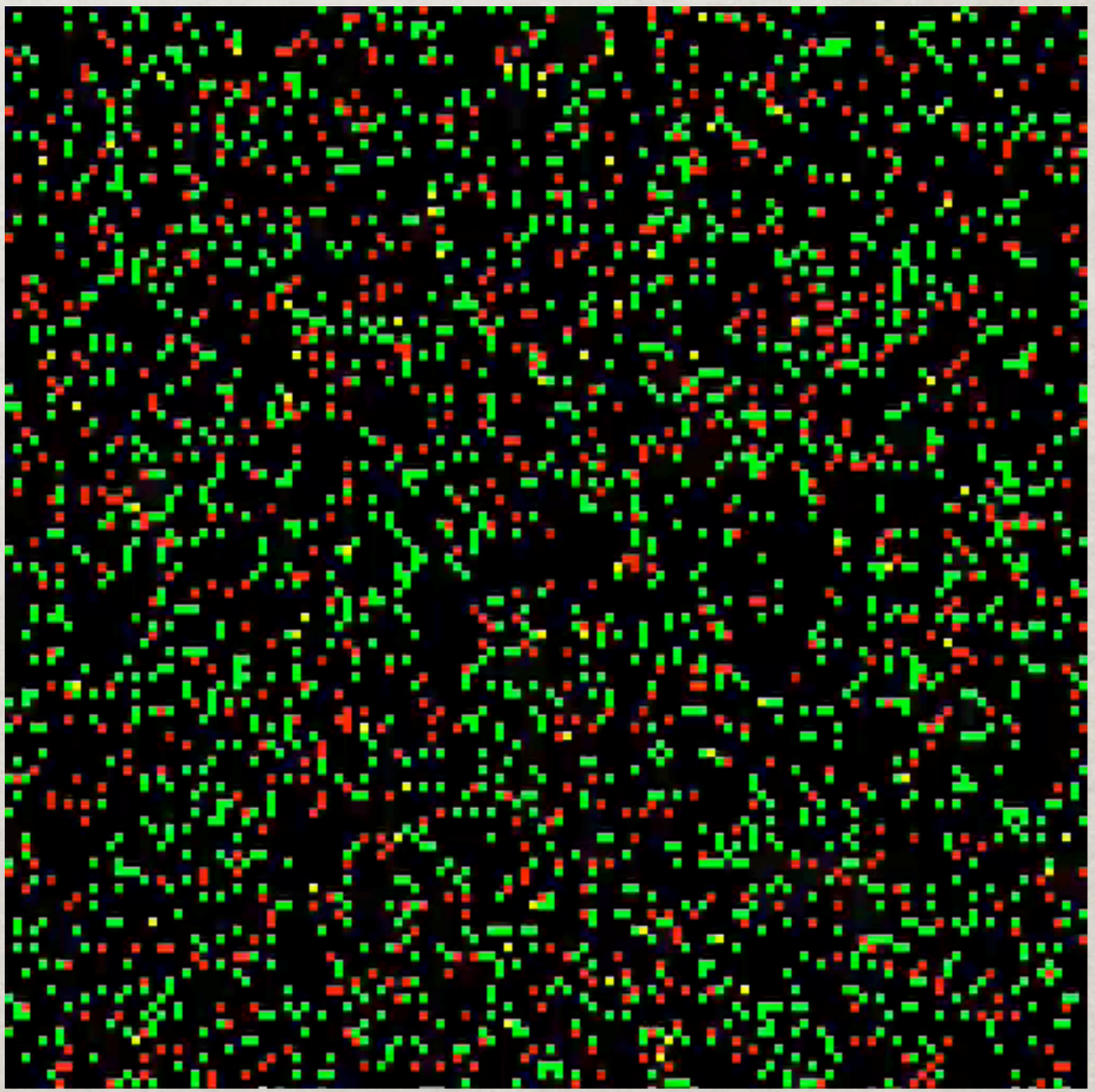

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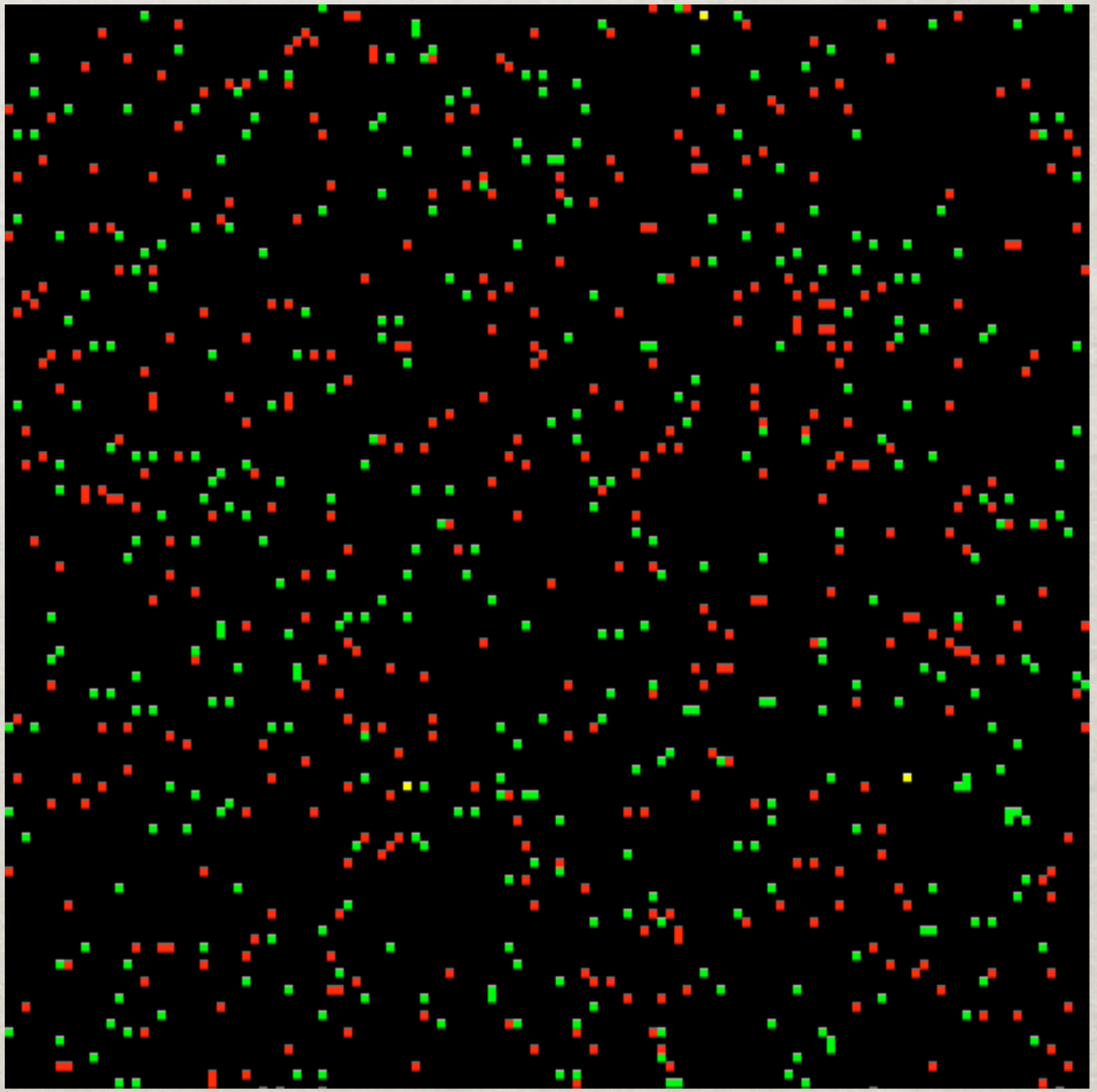

Cellular Automatons

- The shader uses a set of rules to determine from the current state how to get to the next.

- Conway's Game of Life :

Number of neighbours	Old status	New status
<2	live	dead
>3	live	dead
2 or 3	live	live
3	dead	live

Cellular Automaton

Simple automaton. Just need to be able to access previous state of its 8 neighbors.

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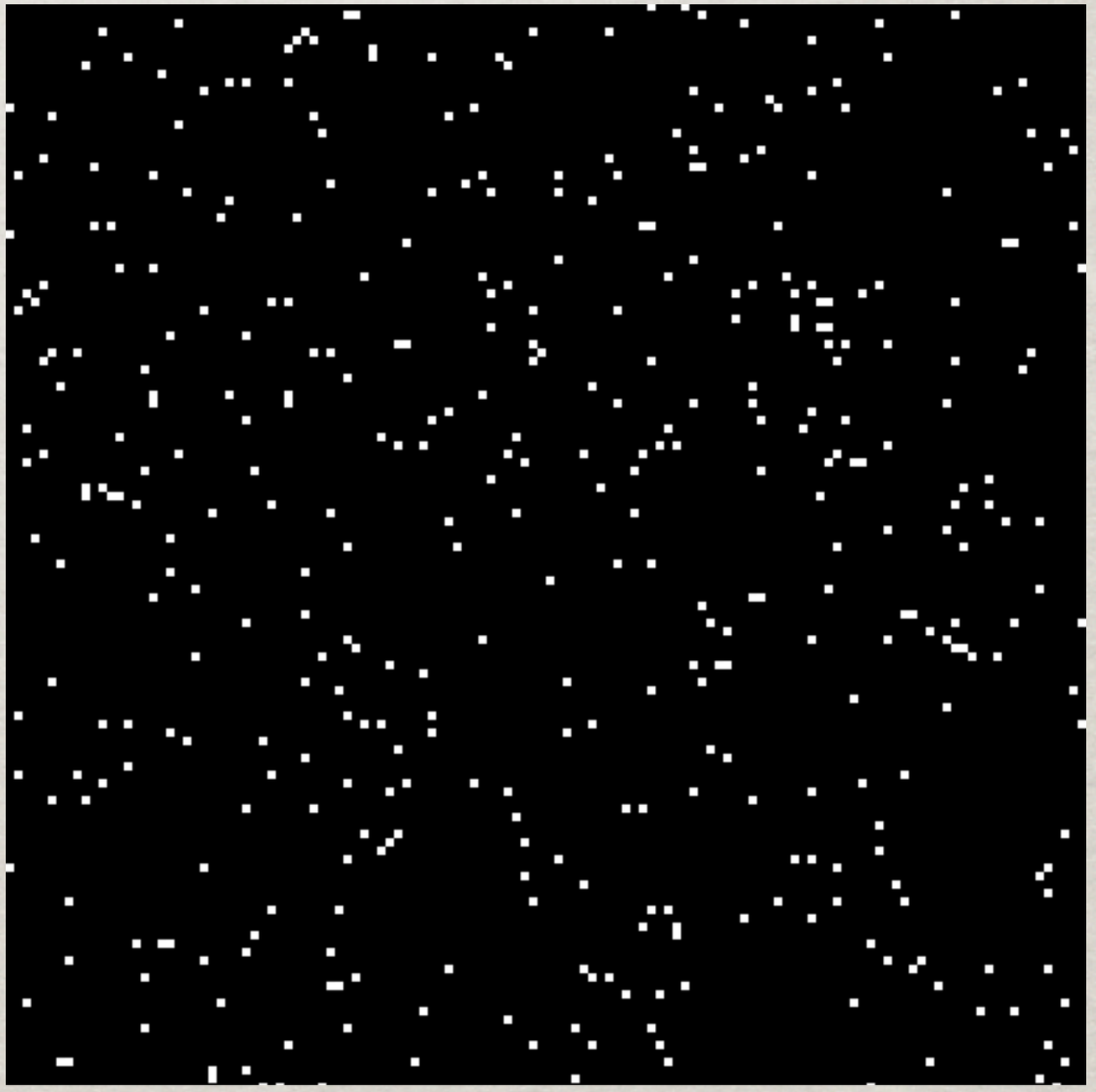

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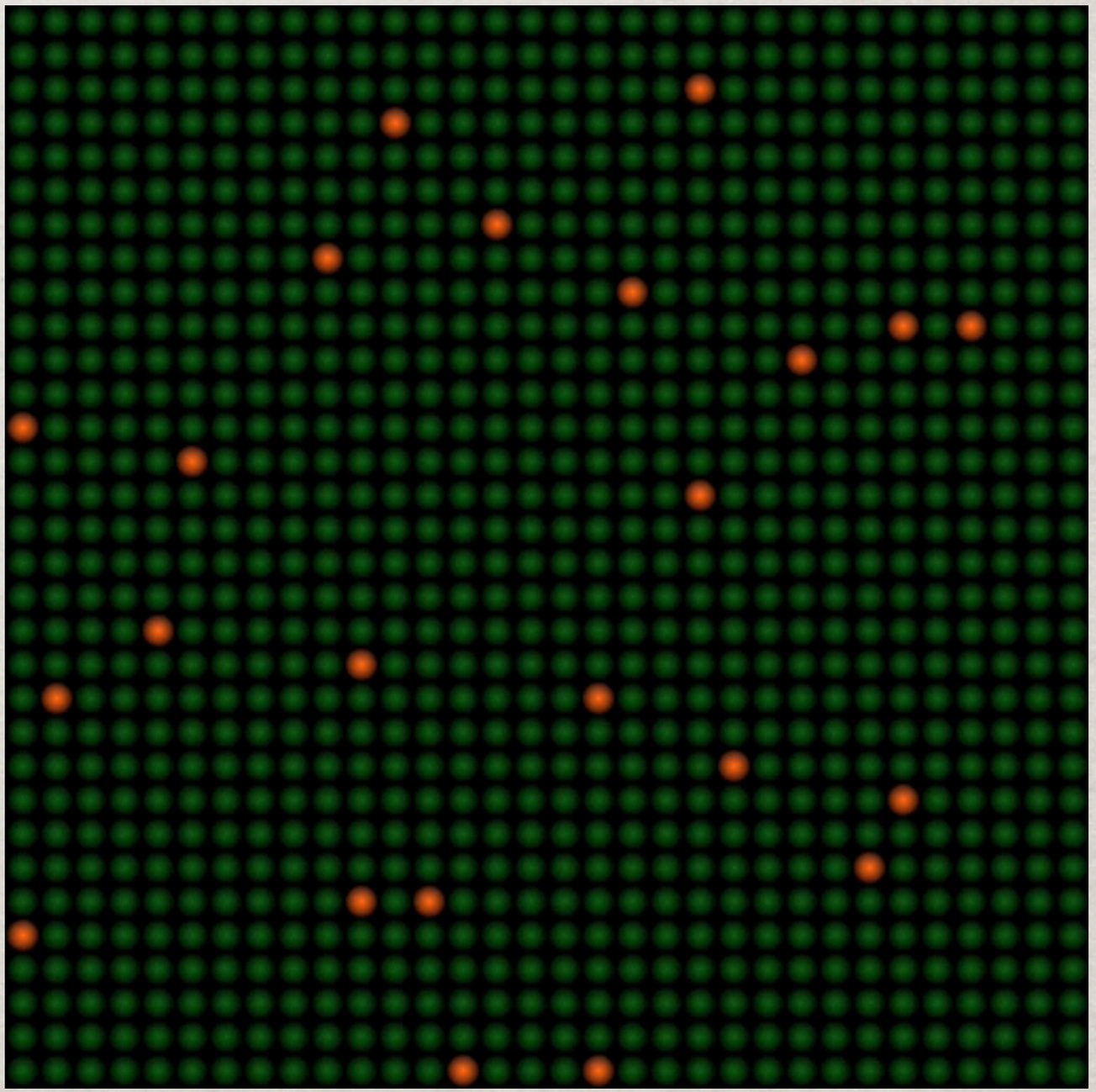

Advanced Automatons

More complex than life. 2-Passes DFA. Use an extra AOV for remembering the pass.

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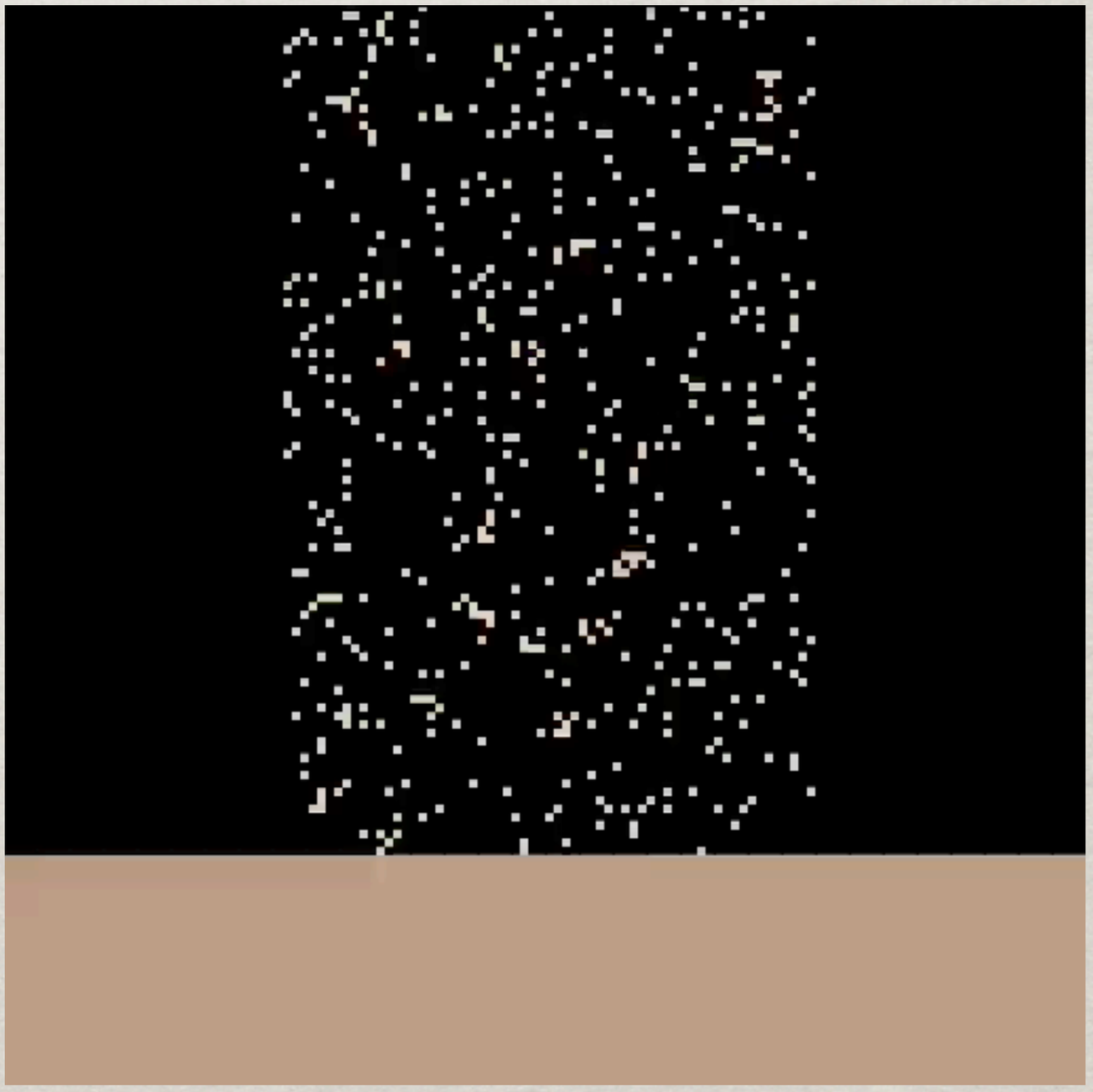

Clock Shader

Texture can be used to control the system by editing them. For example with Photoshop. Created mask.

- Back to basics

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More fun

- There are better games than the Game of Life

Playtime

State used to keep track of score, positions, serving direction,... Actually quite difficult to have a playing strategy that loses.

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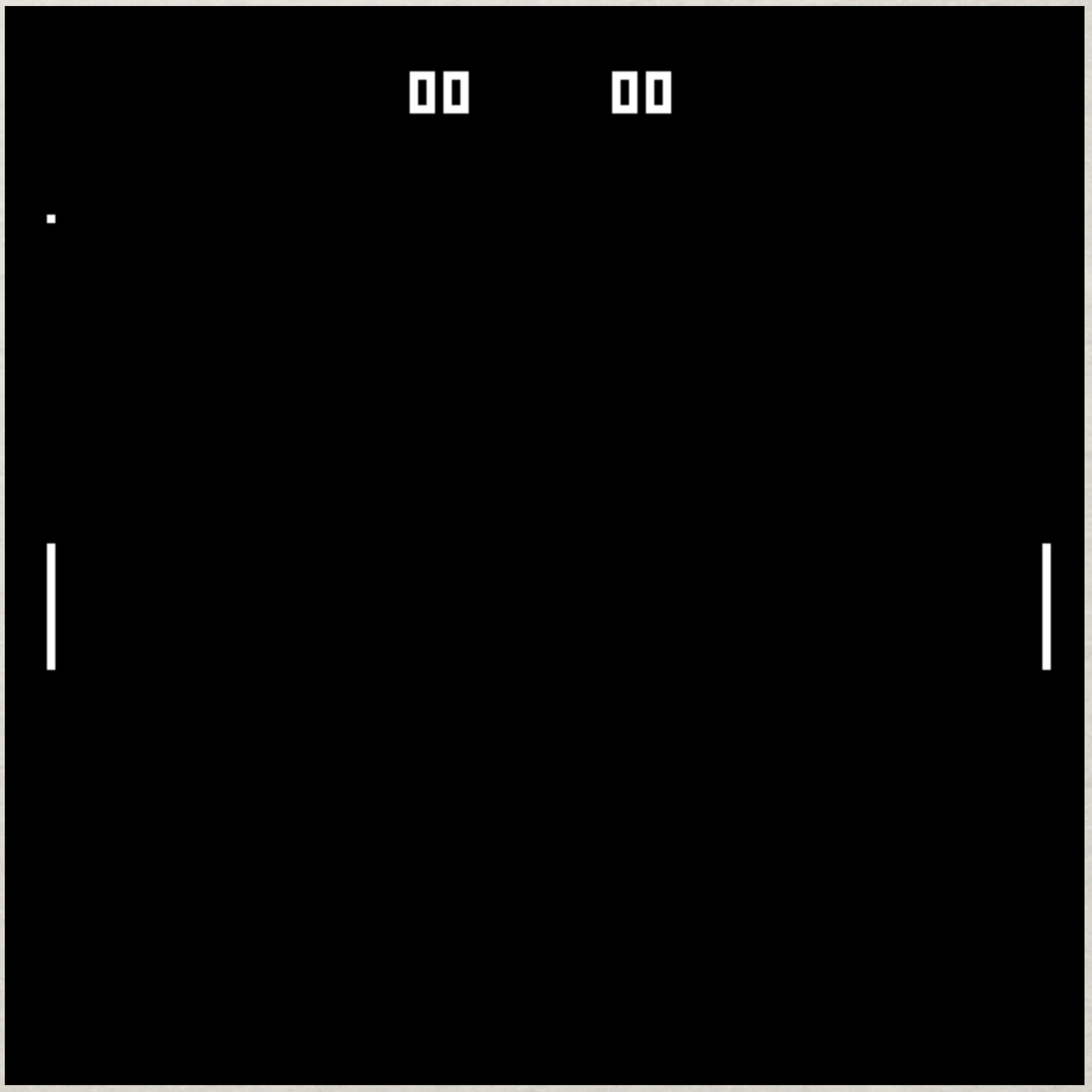

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Where is the 3D ?

- So far everything is a front plane shader
- The front plane shader can be transparent
- Other shaders can reuse the front plane shader result

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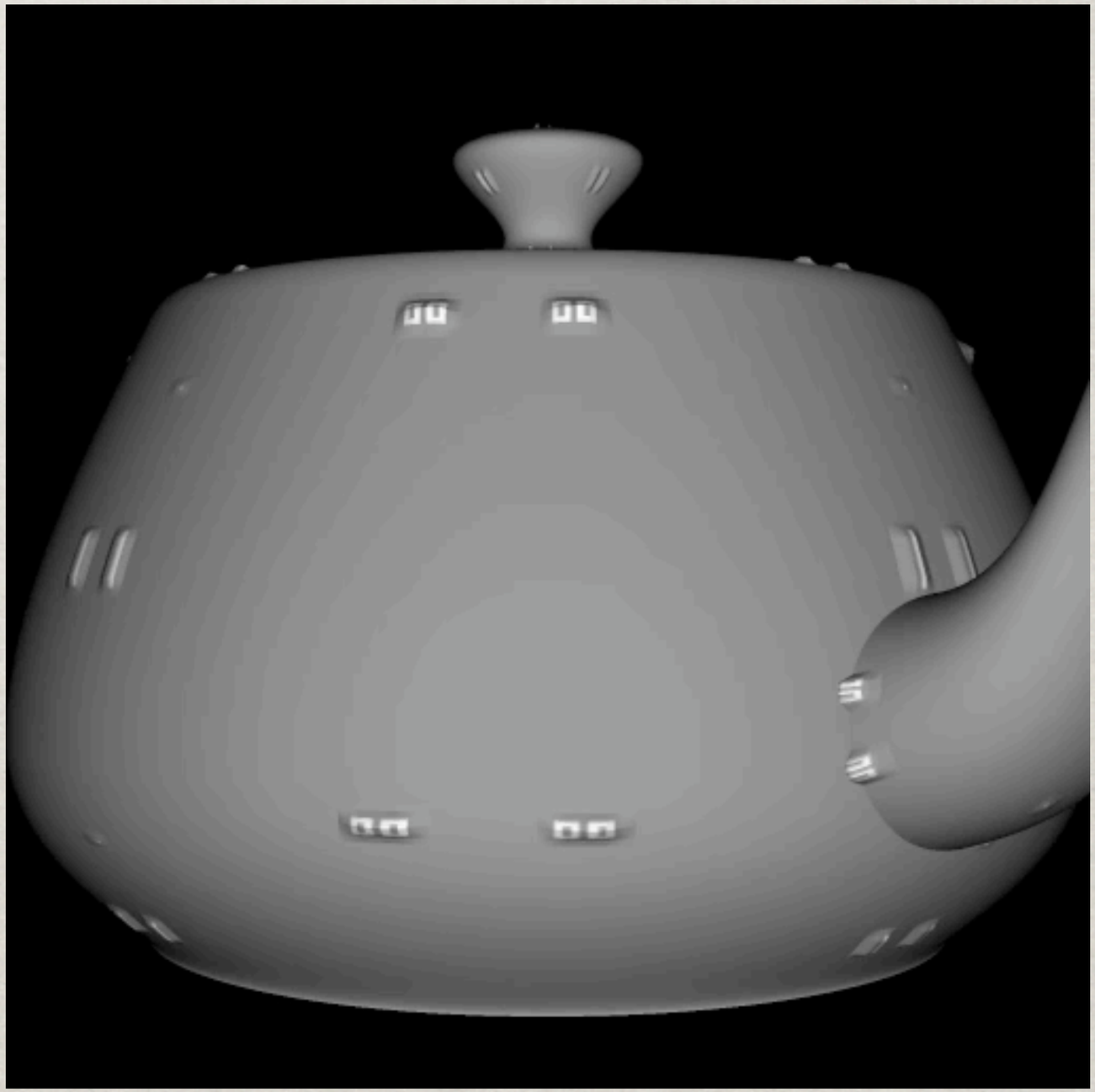

Final thoughts

Can be useful with baking. Not restricted on front plane. Have to be careful with filtering. But would have to use more than just Rib and SL.

- Most expensive screensaver in the world

Combined with IT in merge mode.

- Source code available soon
- http://www.constructive.bz/sltricks.html
- Contact: shaders@constructive.bz