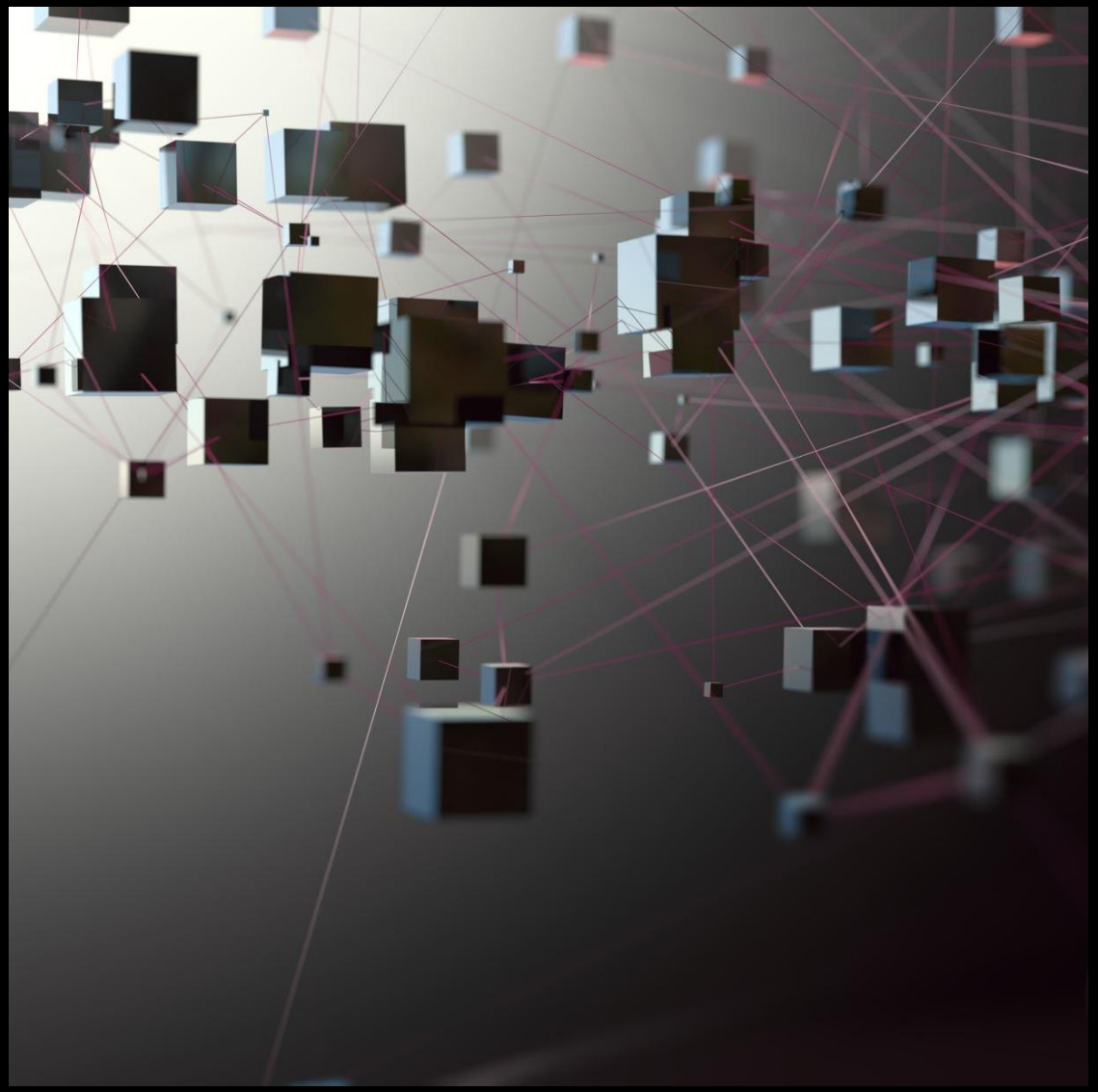
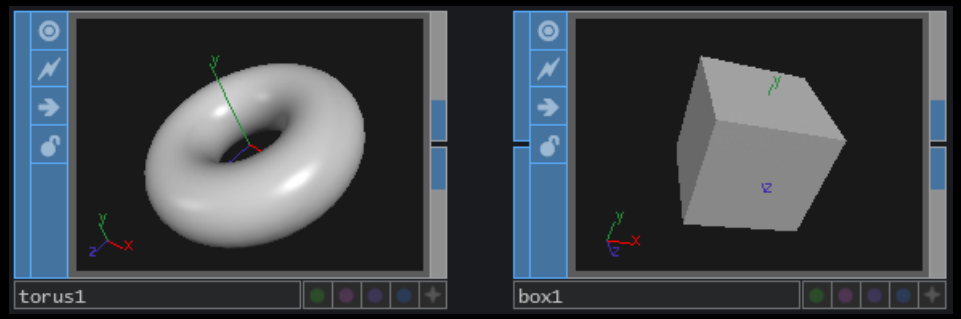
TOUCHDESIGNER
3D-GEOMETRY



THE MAIN OPERATORS

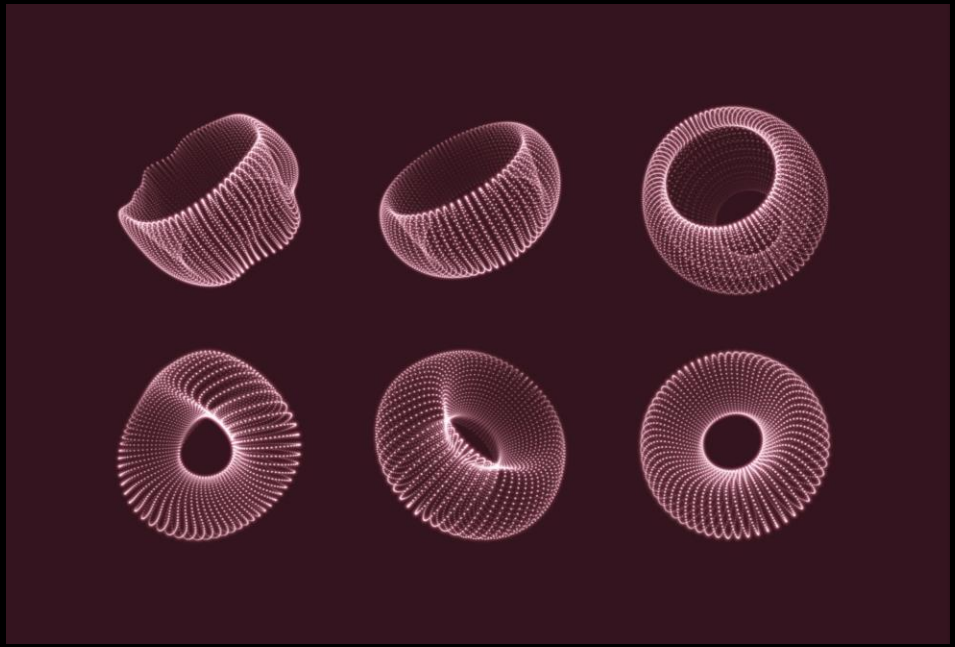
SOP – SURFACE OPERATORS



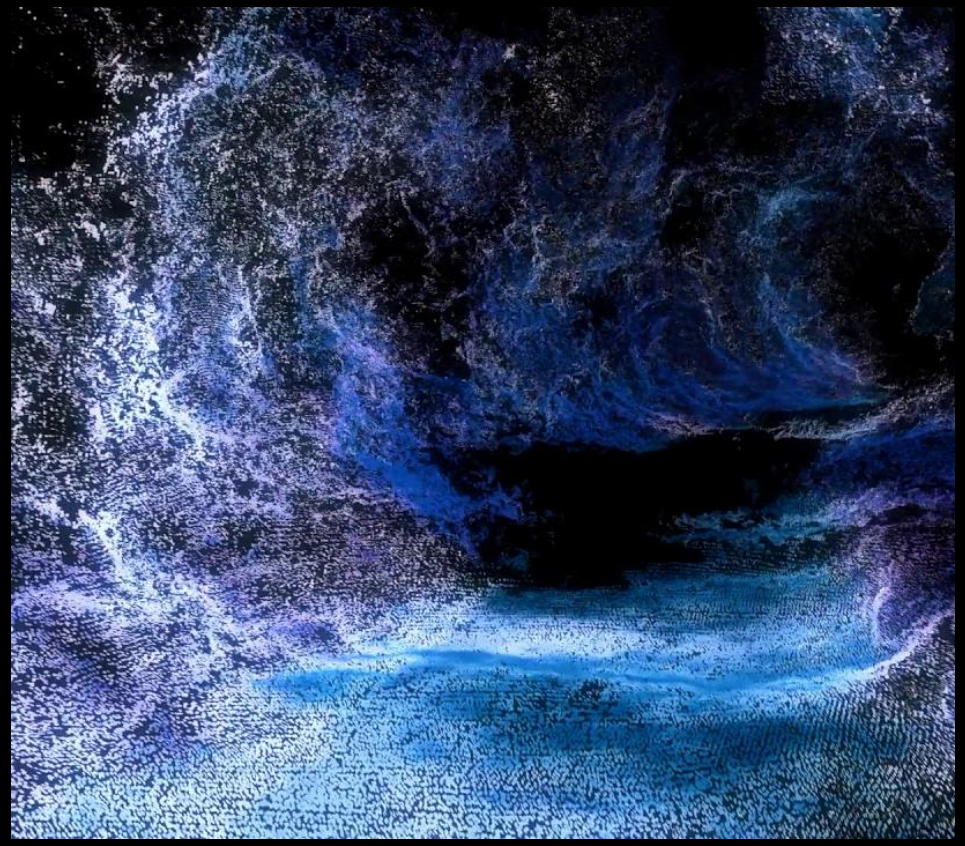
- Generate
- Import
- Manipulate 3D-surfaces or also called geometry

MAIN SUPPORTED SURFACE TYPES

- 3D points
- Polygons
- Lines
- Surfaces
- Spheres
- meatballs

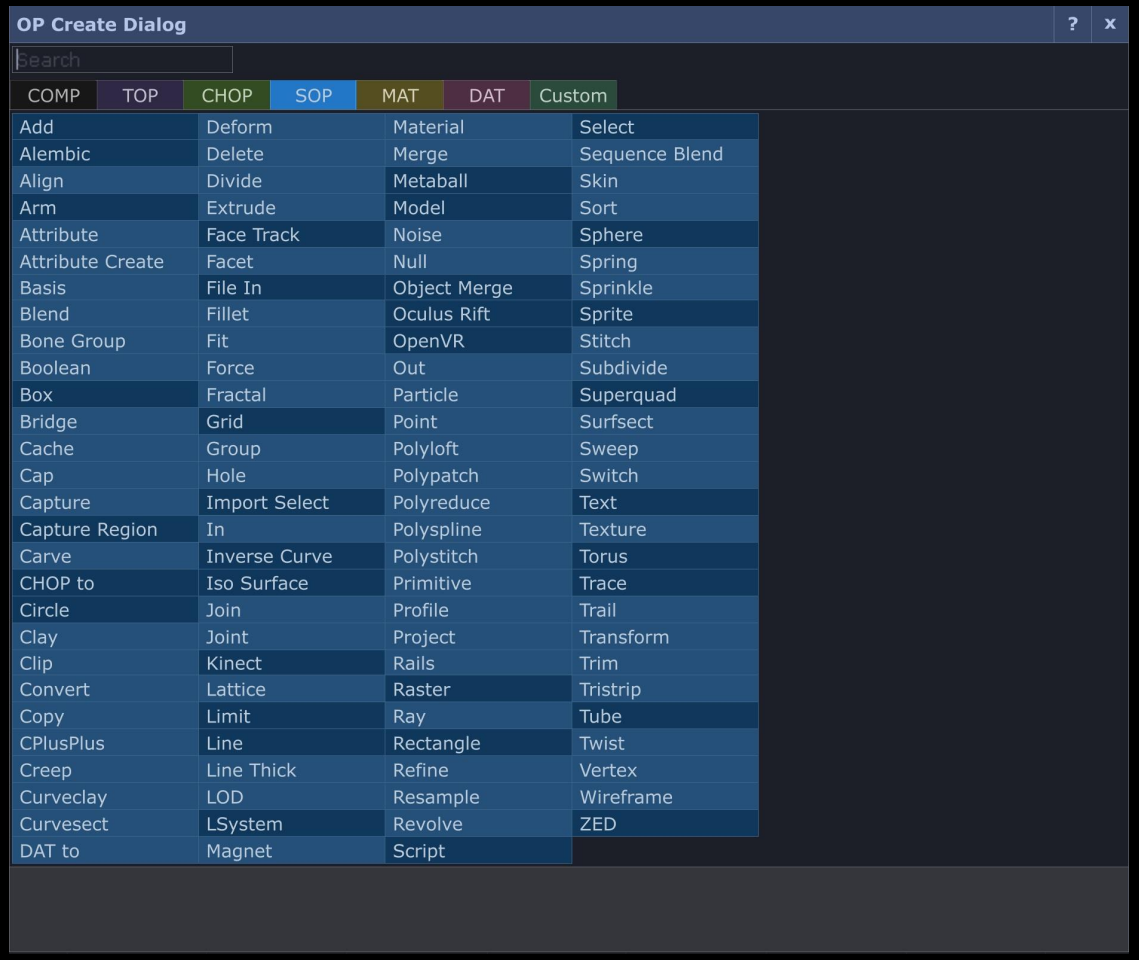


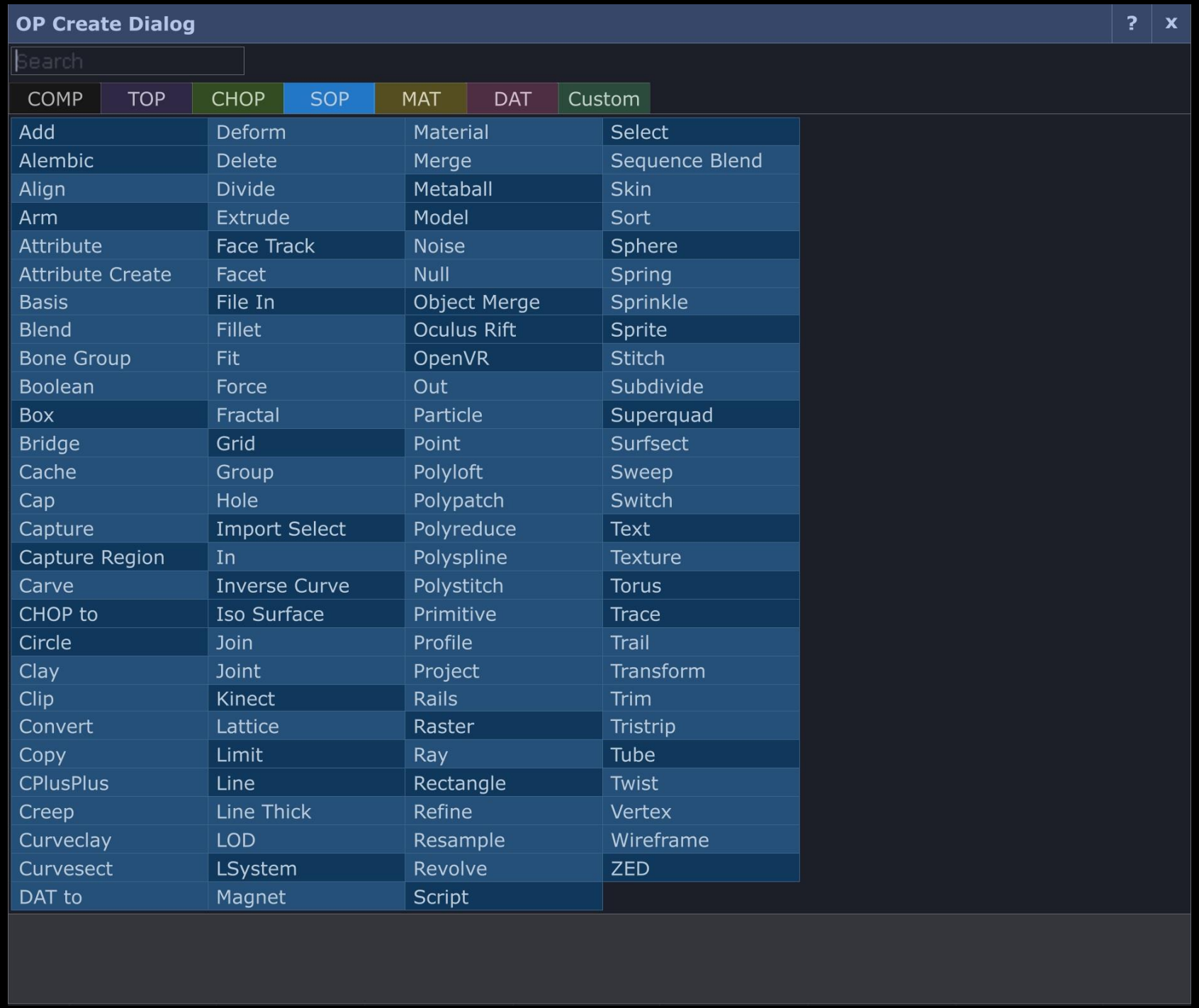
A DIFFERENCE IN SYSTEMS



- In earlier versions of Touchdesigner *PARTICLES* and *POINTCLOUDS* were also made in SOP's. It showed that working on larger projects it became too CPU straining and they moved them to the TOP domain resulting in GPU rendering and a big relieve for your computer.

A FIRST LOOK AT ALL THE SOP'S





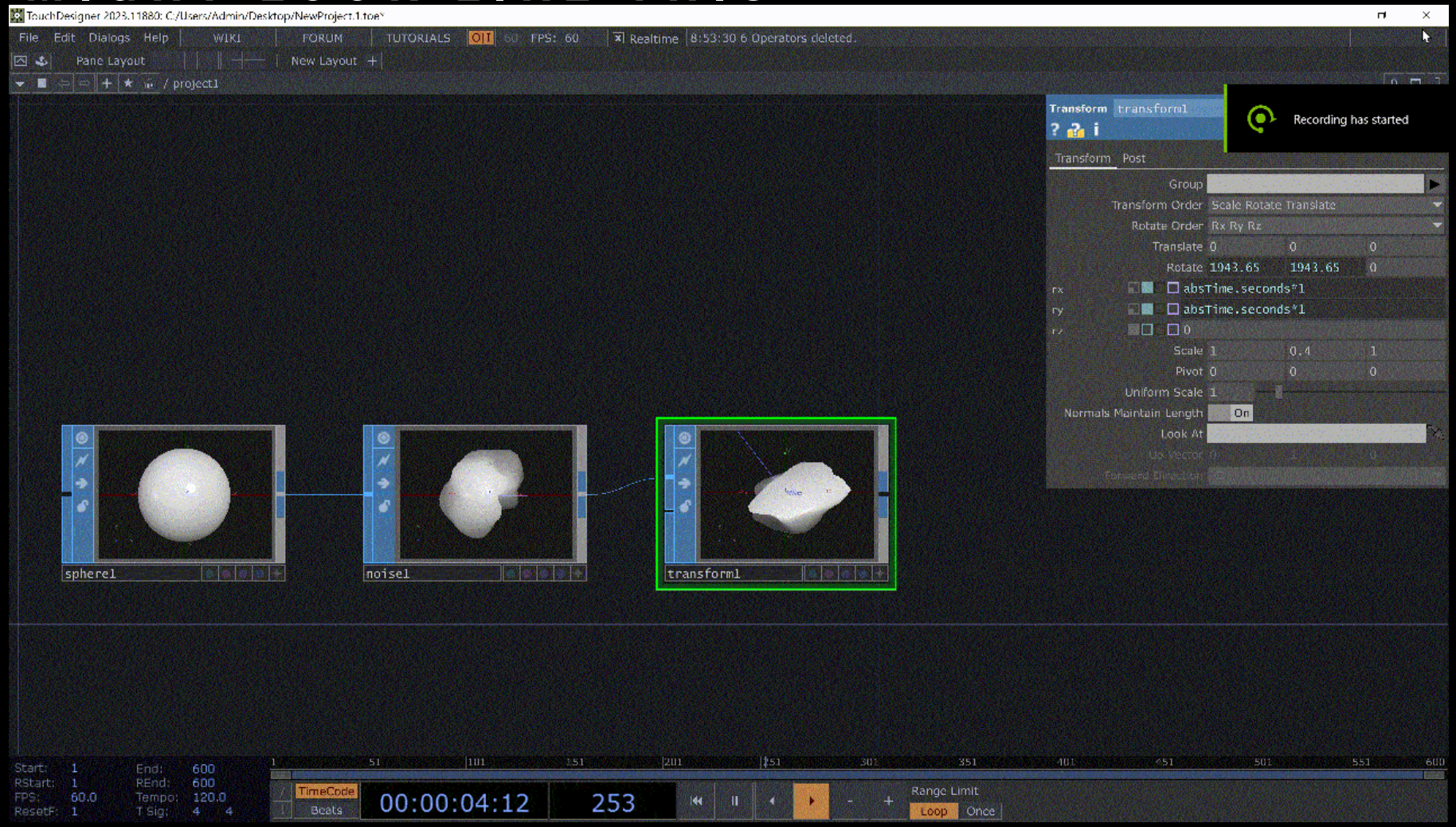
Couple of operators might look familiar to last week for example:

- Noise
- File in
- Switch

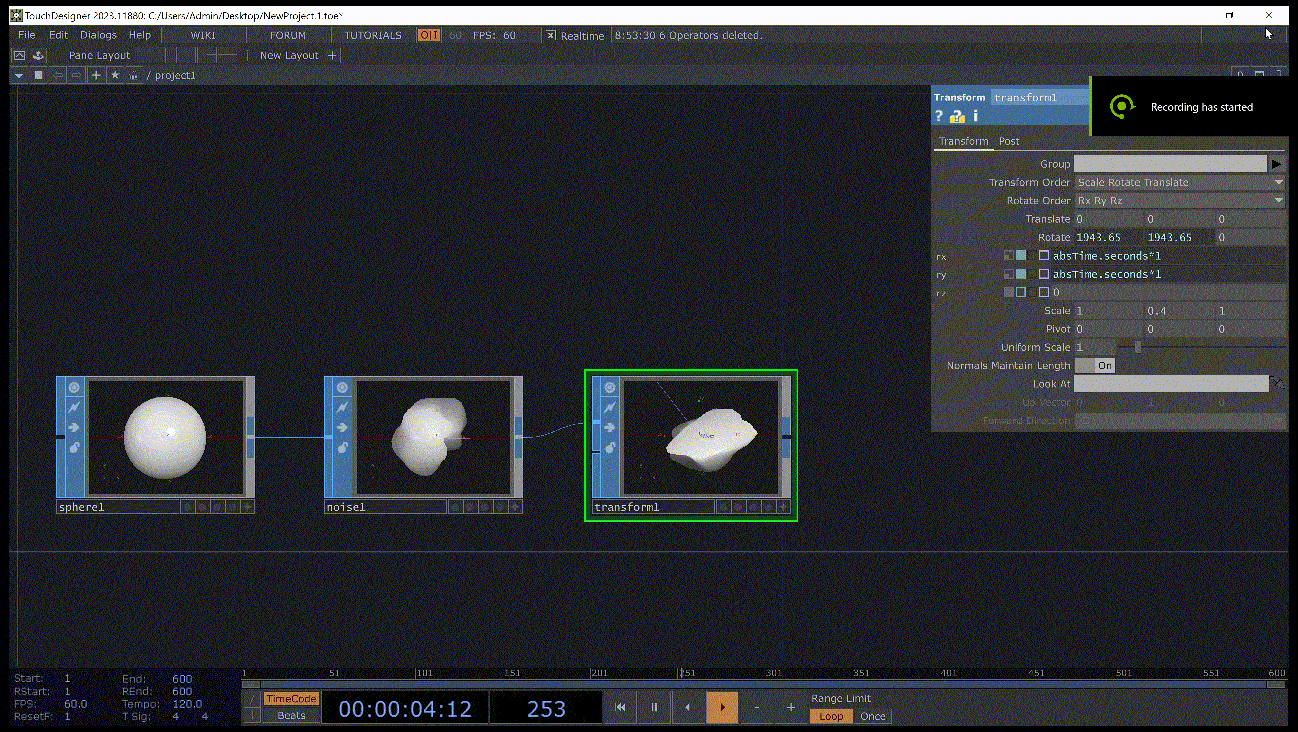
But probably most of them are new. Basic geometry shapes are:

- BOX
- CIRCLE
- METABALL
- RECTANGLE
- SPHERE
- TORUS
- TUBE

IF WE CREATE A RANDOM SOP NETWORK IT MIGHT LOOK LIKE THIS



OBSTACLE!



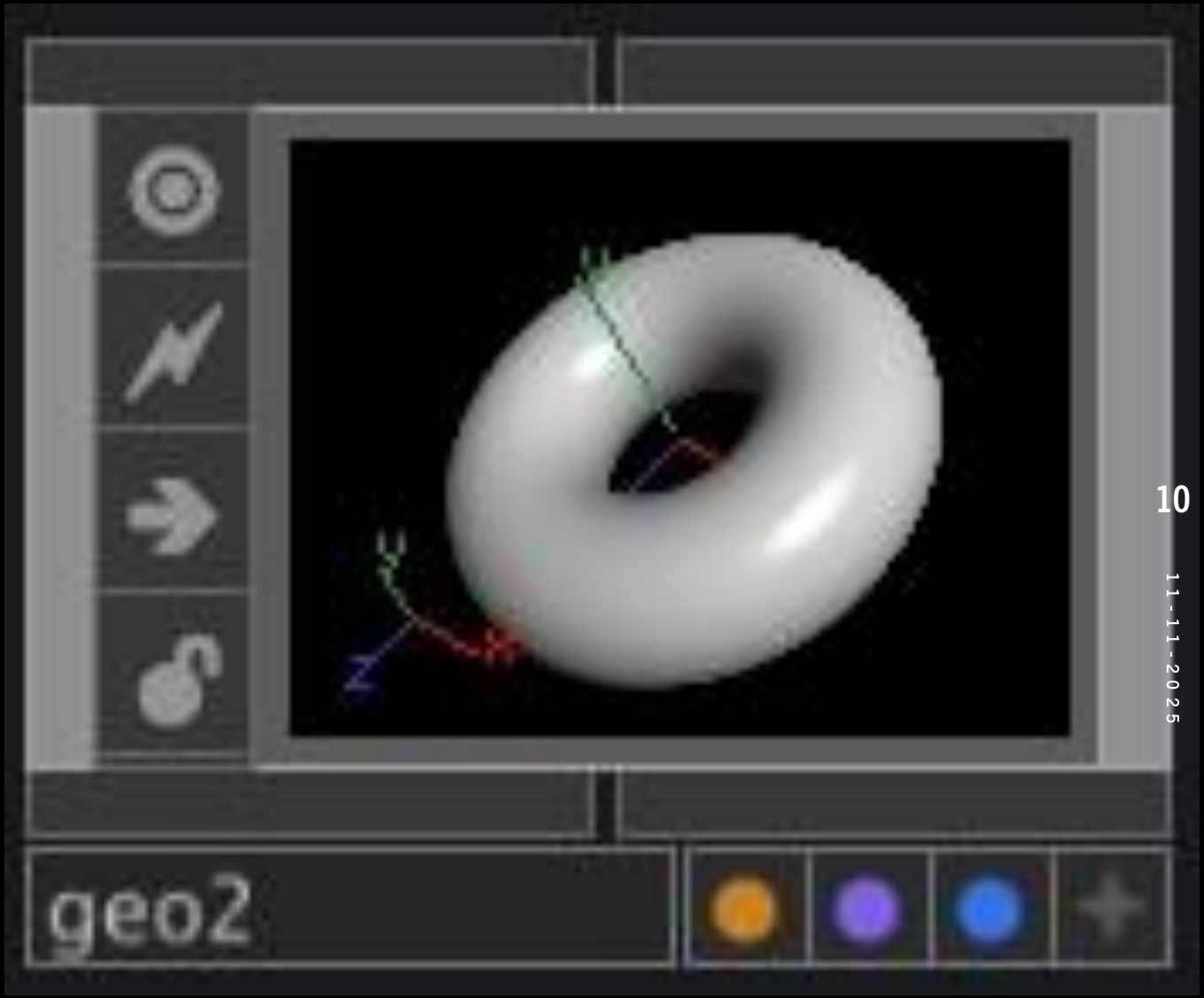
- Unfortunately SOP stays in the surface domain and cannot be mixed on the fly into video or TOP domain.
- Hence I needed to make this crappy GIF
- So we need some way to convert the image, not the data, into the TOP domain.

INTRODUCING: GEOMETRY COMP

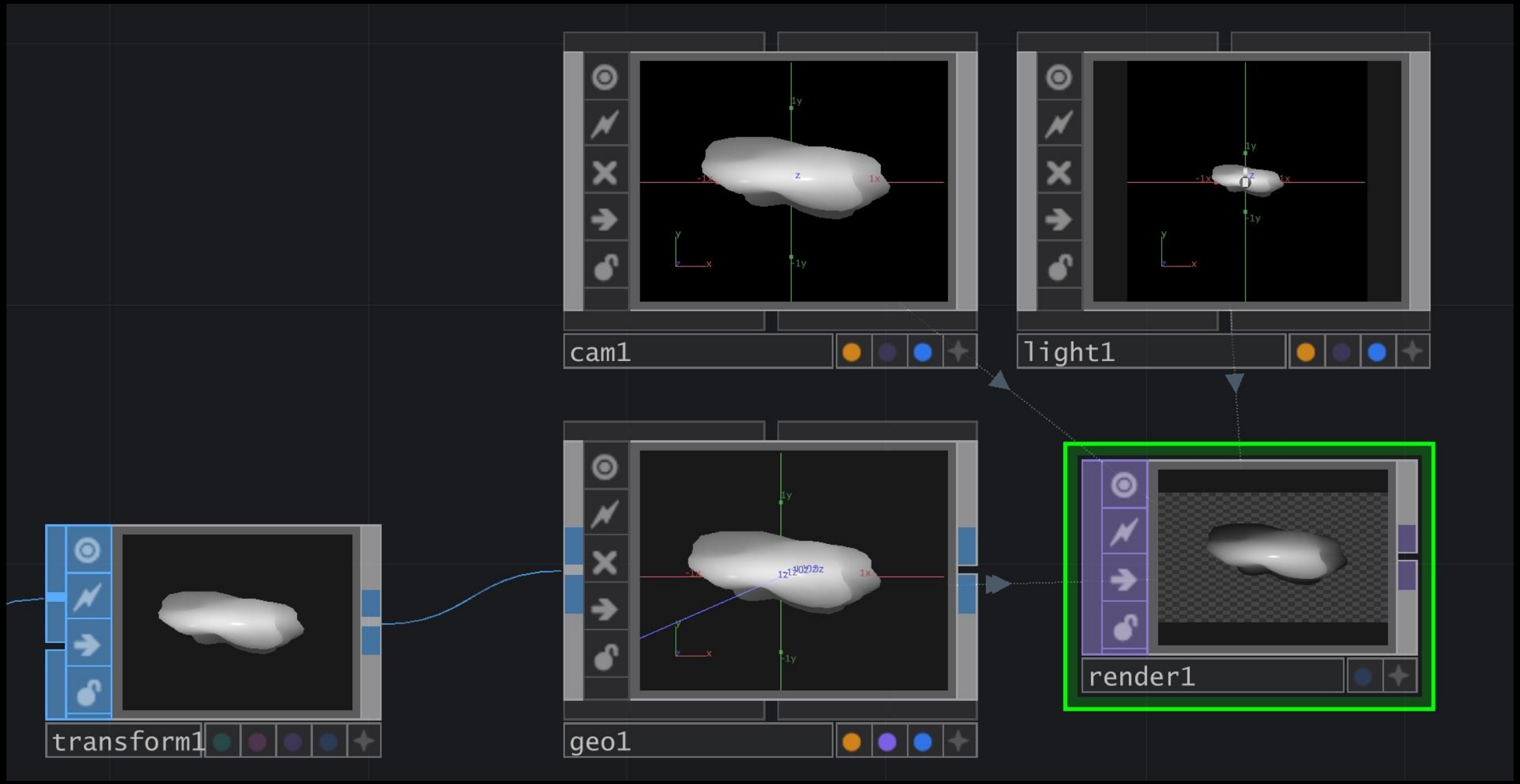
The GEOMETRY COMP can be used at the *end* of your SOP network to convert it into TOP picture information. It needs a couple of additional operators in order to do so succesfully.

- Camera COMP
- Light COMP
- Render TOP
- Geometry COMP

These four operators live in the heart of your SOP and TOP combined networks.



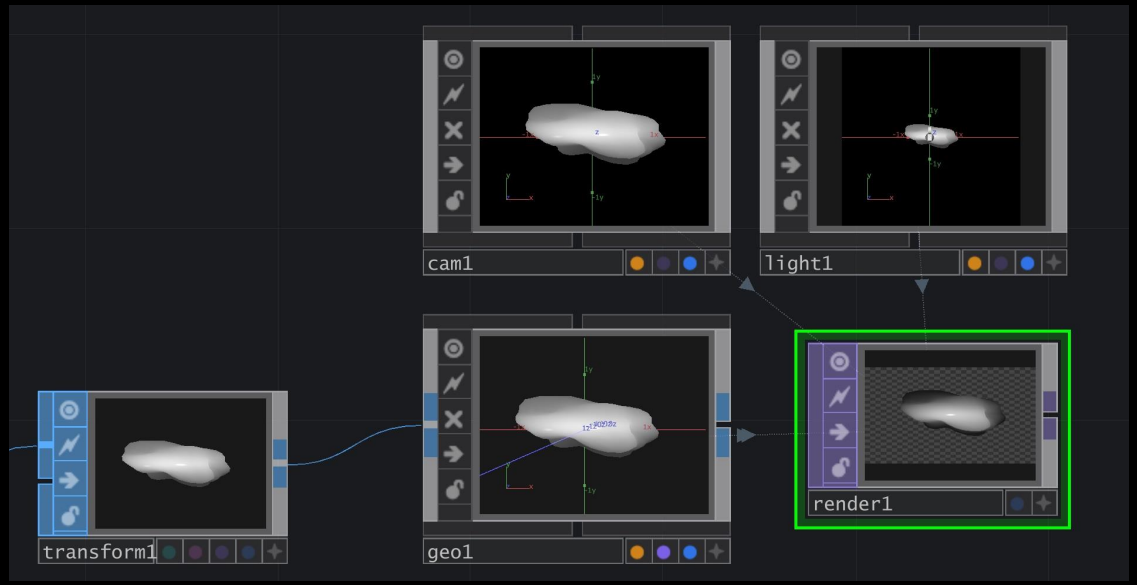
A SUCCESFUL CONVERSION FROM SOP TO TOP



A COUPLE OF CONFUSING THINGS

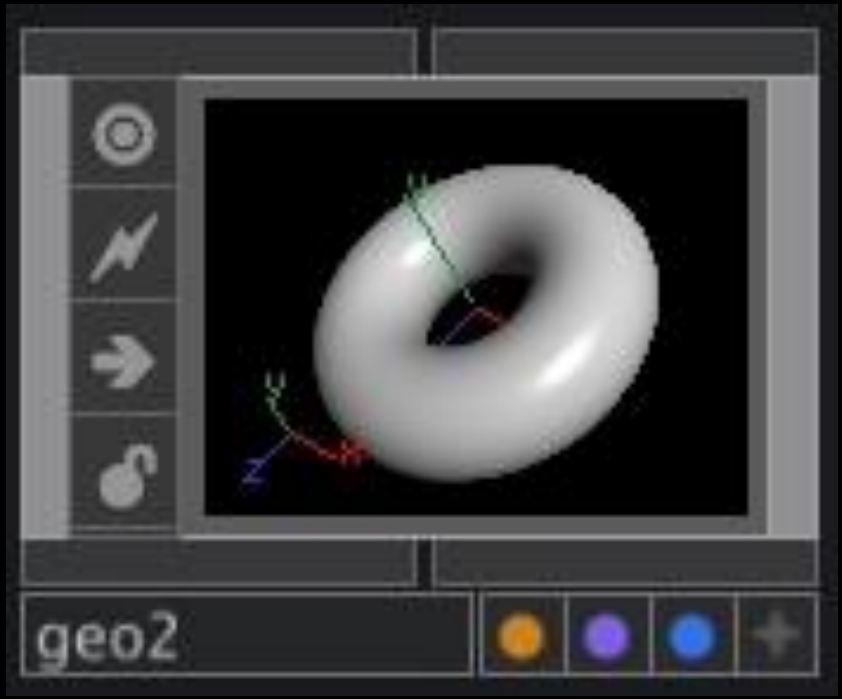
When going from SOP to TOP through a geometry COMP, camera COMP and a light COMP to a render some confusing things might occur to you.

- The geometry COMP changes appearance
- The geometry COMP is still blue, referencing SOP but goes to TOP?
- There are no wires between geometry, camera, light COMP and render TOP?



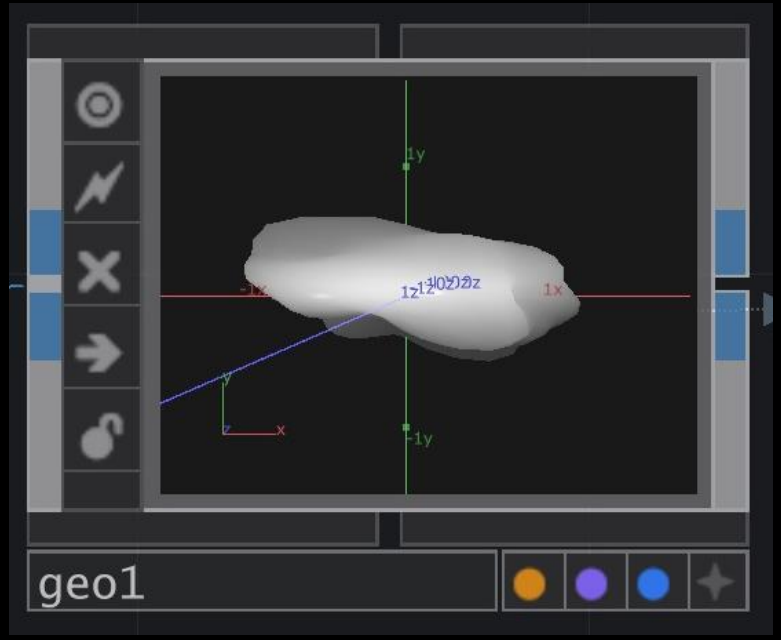
CHANGE OF APPEARANCE

- NO INPUT
- NO OUTPUT
- NO ASSOCIATED OP FAMILY



WHEN CONNECTED TO A SOP

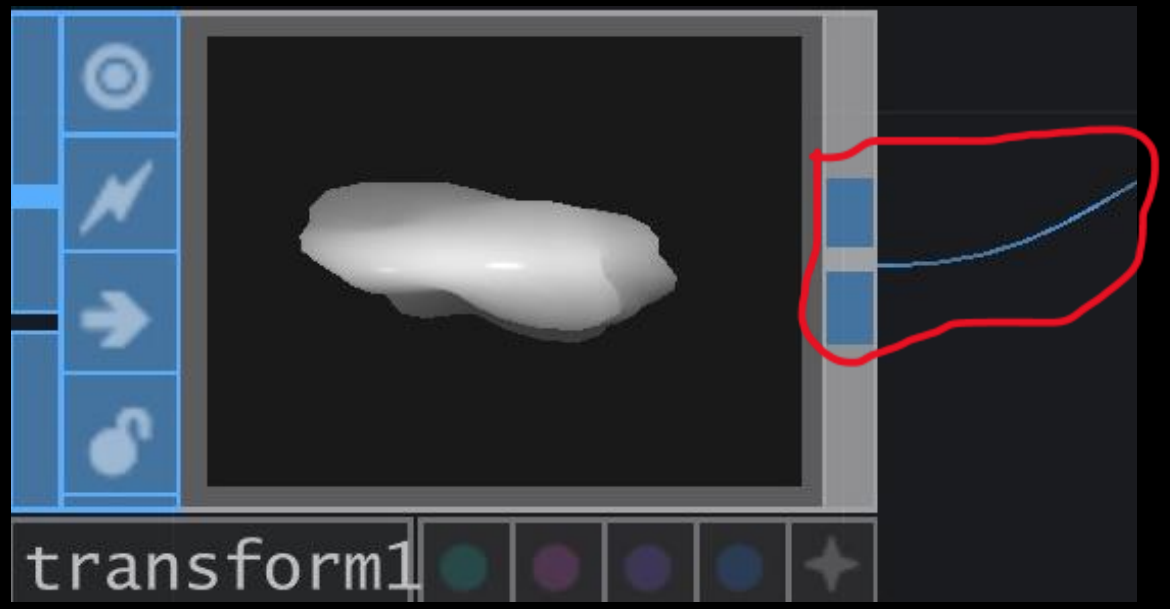
- INPUT
- OUTPUT
- ASSOCIATED WITH SOP FAMILY



HOW TO CONNECT THE LAST SOP TO THE GEOMETRY COMP WHEN THERE ARE NO INPUTS?

YOU RIGHT CLICK ON THE OUTPUT OF THE LAST SOP IN YOUR NETWORK. RIGHT CLICK WILL AUTO OPEN OP CREATE DIALOG > COMP > GEOMETRY

YOU FIRST LEFT CLICK ON THE OUTPUT SO YOU SEE THE WIRE > TAB ON THE KEYBOARD > COMP > GEOMETRY

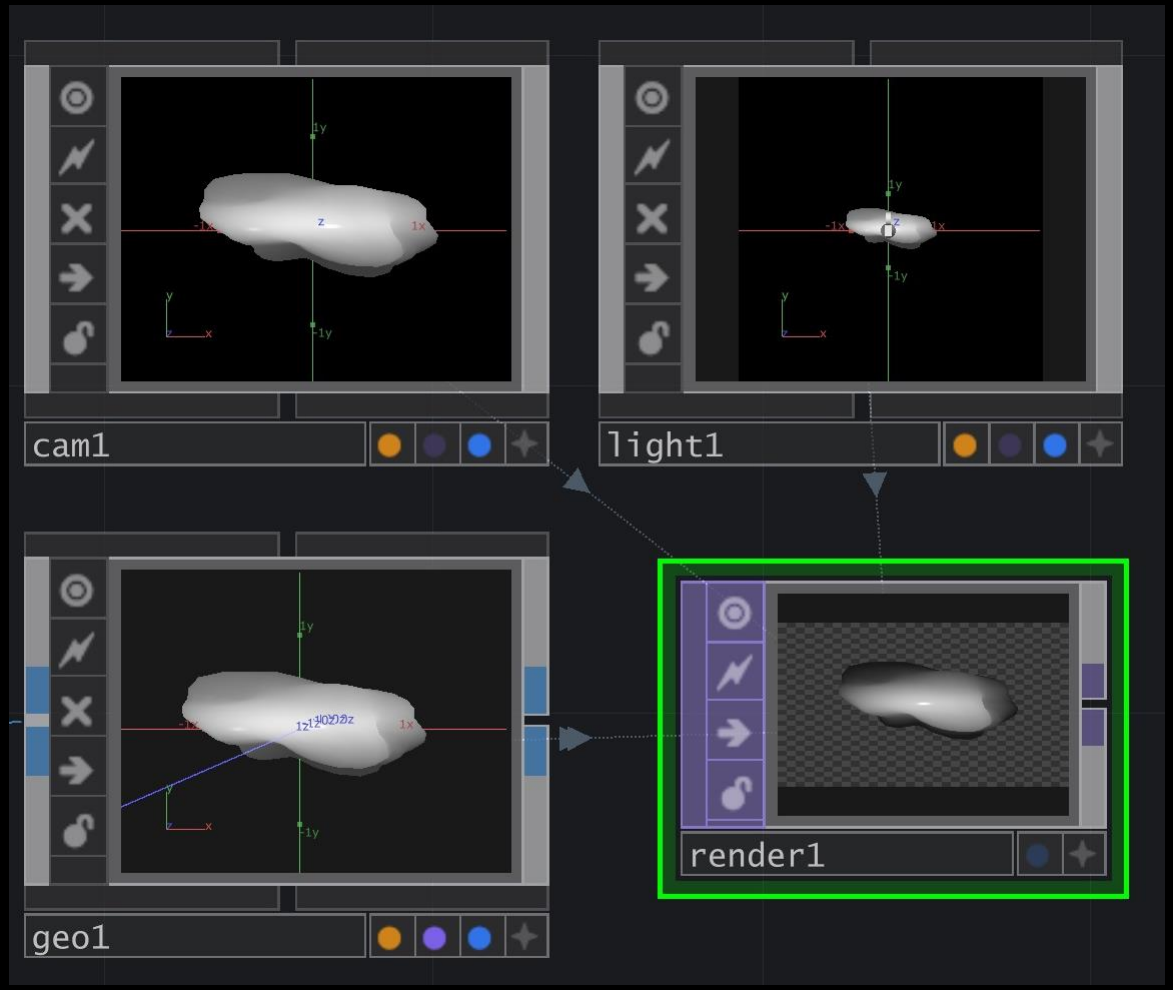


WHERE DID THE WIRES GO?

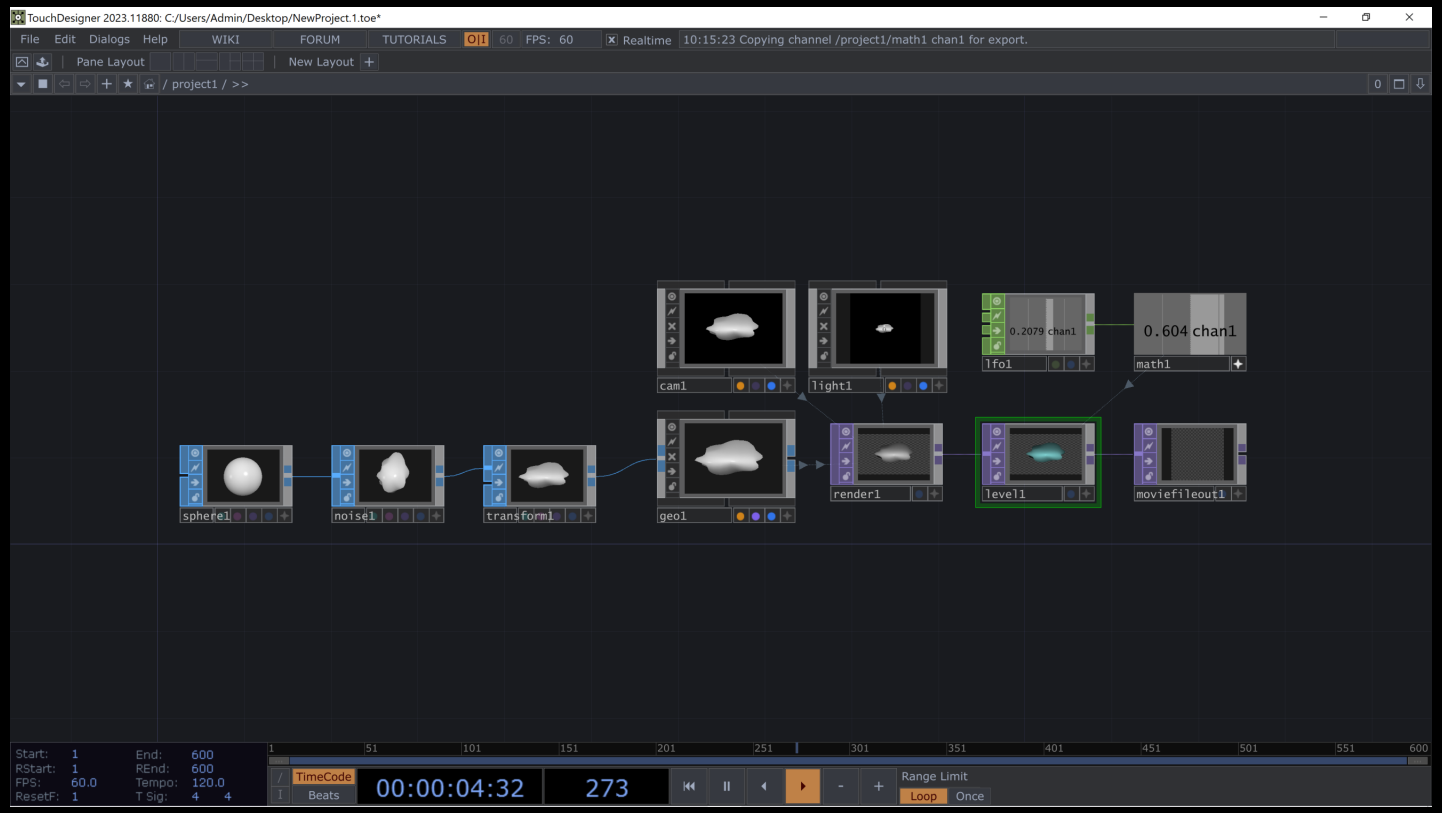
There are multiple connections between operators possible in Touchdesigner. The two most common are:

- Wires
- Dotted lines

We know the wires and the dotted lines we also saw last week. A dotted line means that information is being referenced between different operators. Within or mixing families. The small arrow traveling over the dotted line indicated the flow of information so you know where it is coming from and where it goes to.



AFTER RENDER TOP YOU CAN BUILD YOUR NETWORK AS WE PRACTICED LAST WEEK



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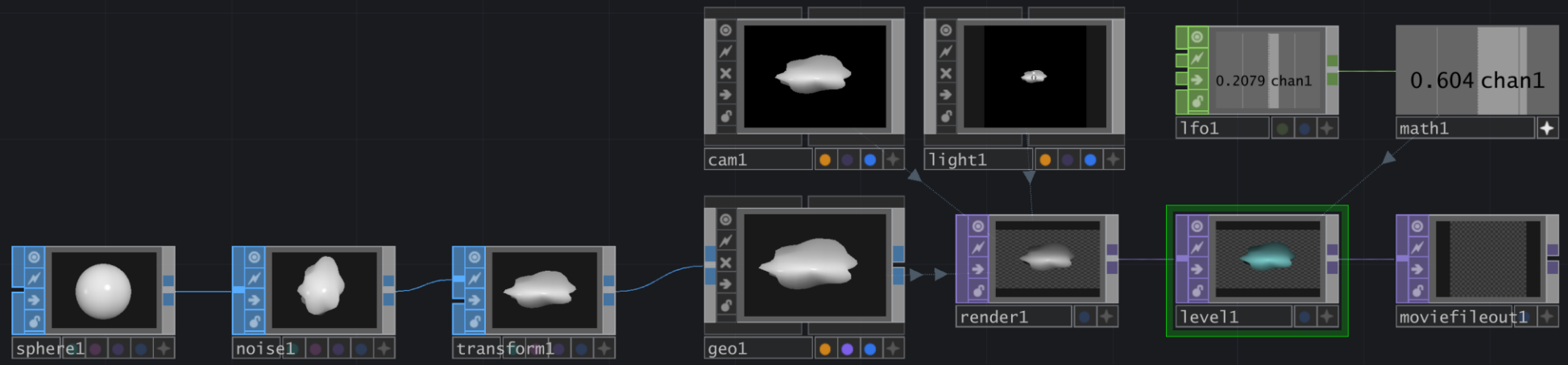
Pane Layout New Layout

/ project1 / >>



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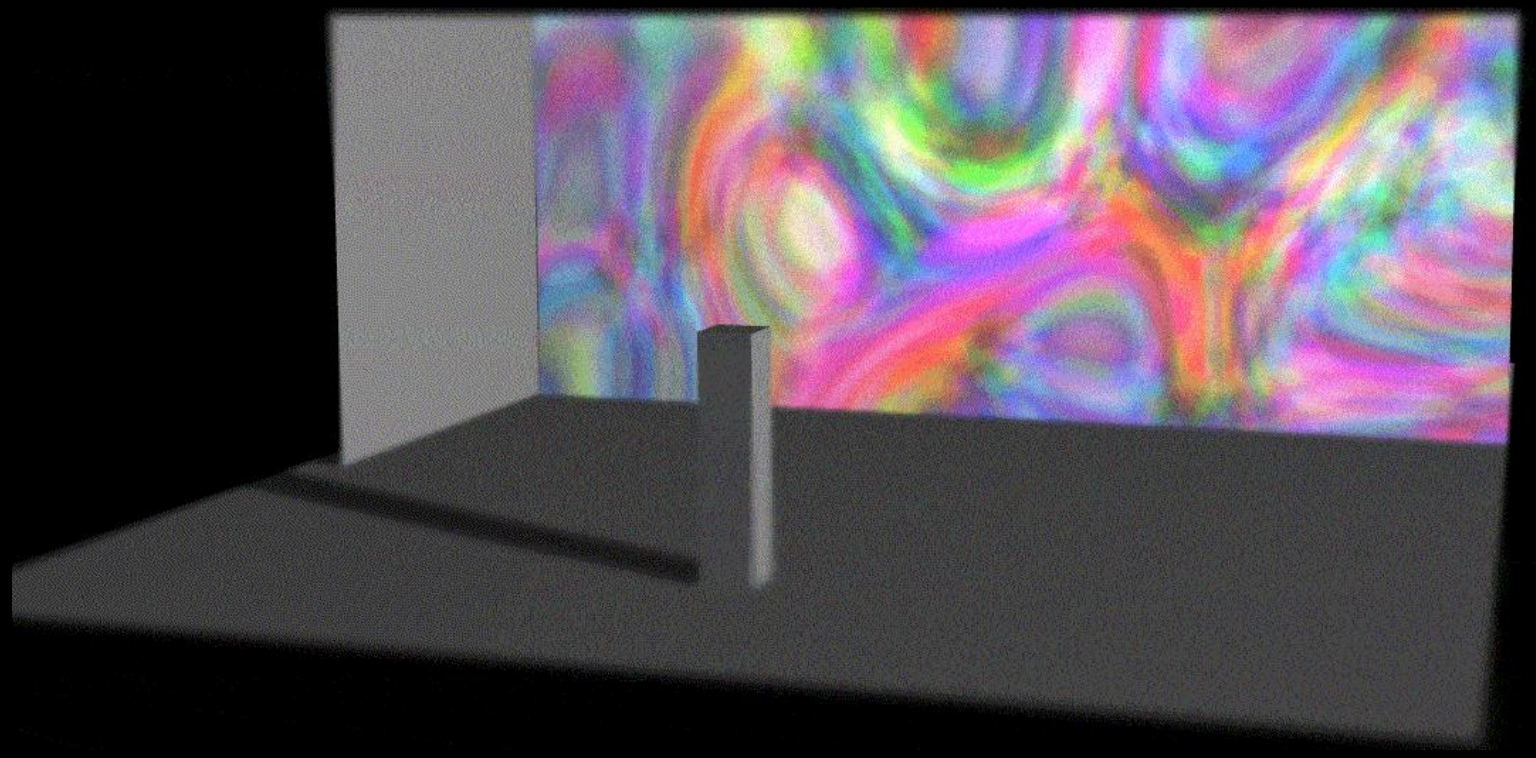
FPS: 60.0 Tempo: 120.0
ResetF: 1 T Sig: 4 4

1 51 101 151 201 251 301 351 401 451 501 551 600

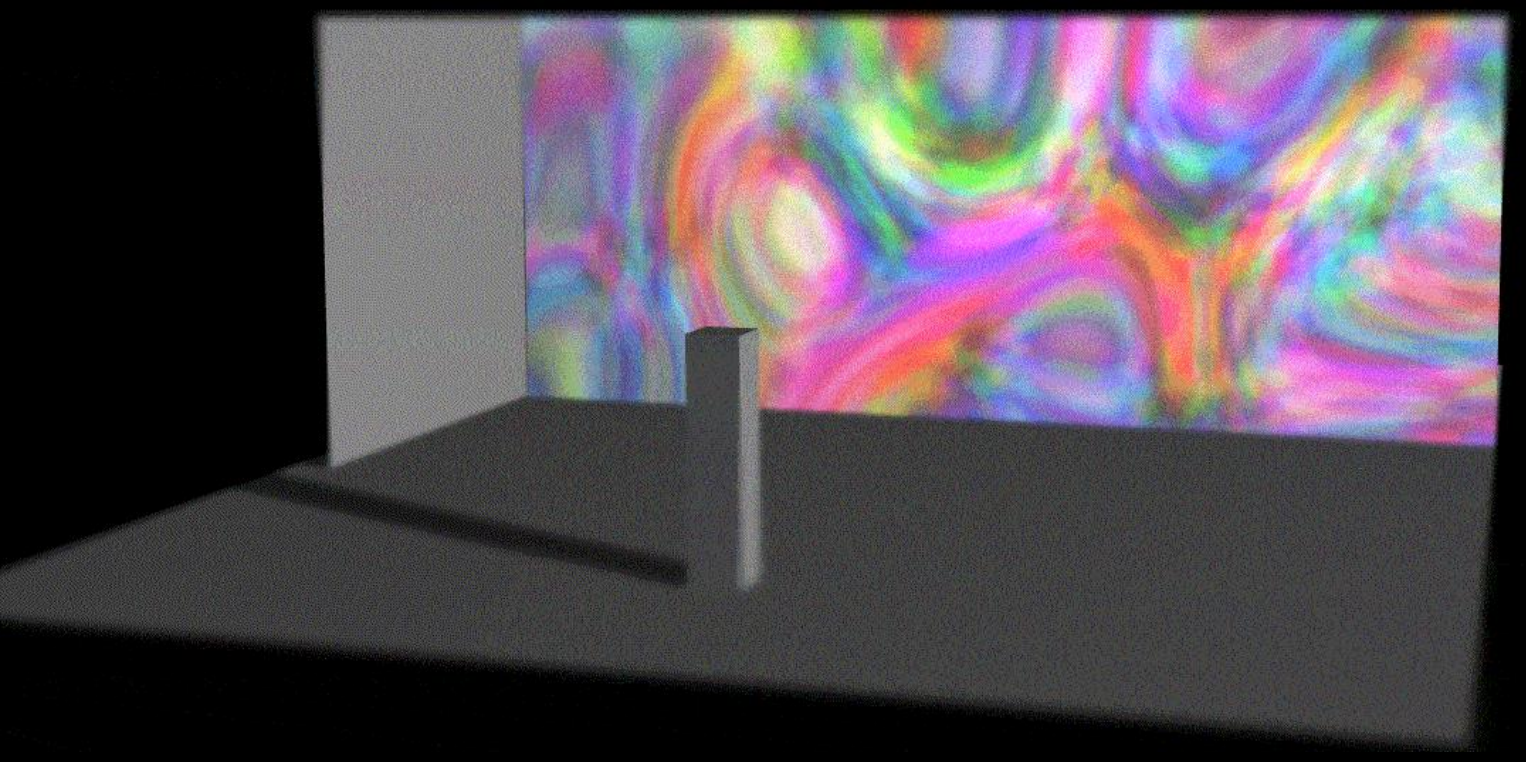
TimeCode Beats 00:00:04:32 273

Range Limit Loop Once

CASE: A SITUATIONAL RENDER

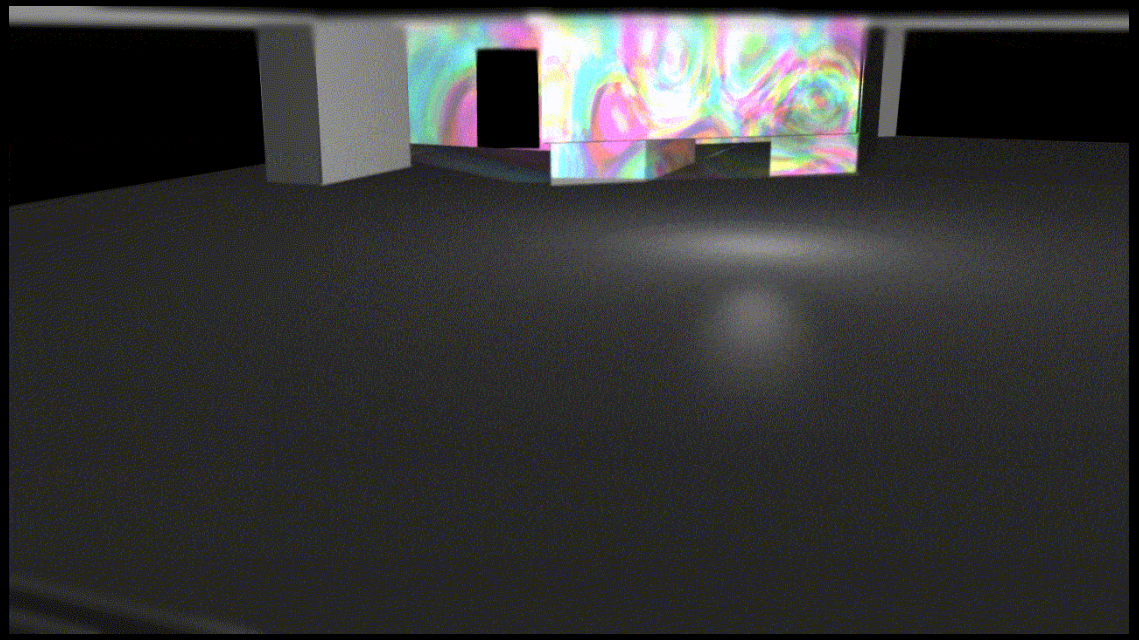


CASE: A SITUATIONAL RENDER BREAKDOWN



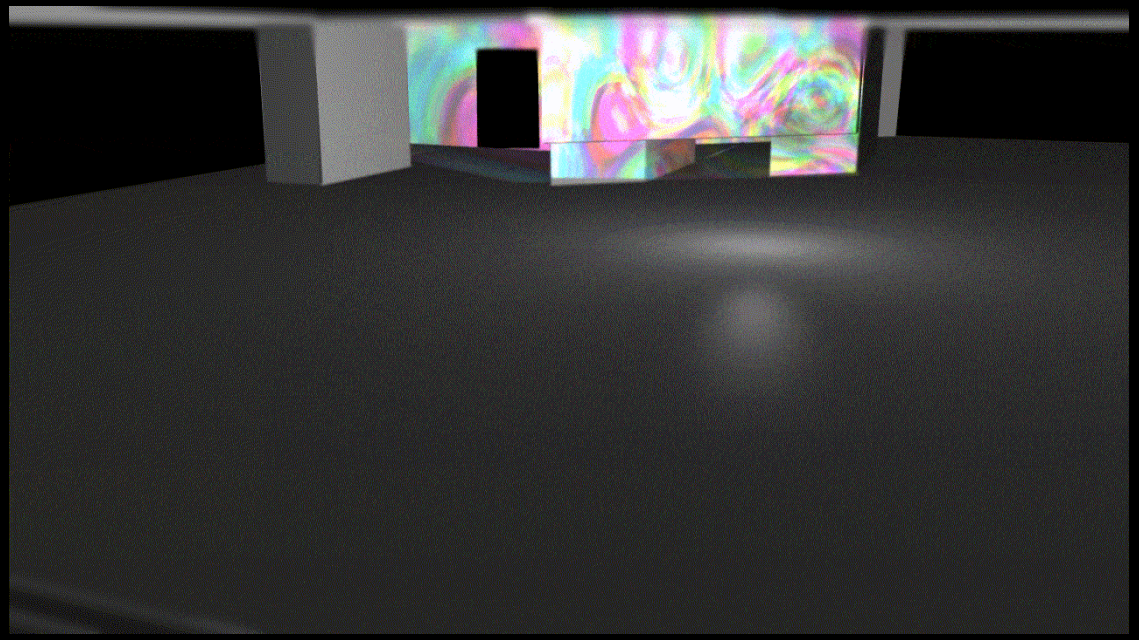
- Multiple surfaces
- Geometry comp for each surface
- One camera
- Two lights, one as projector one for normal lighting
- Some form of animation
- Render top
- Tilt-shift effect

CASE: MAIN HALL SITUATION RENDER

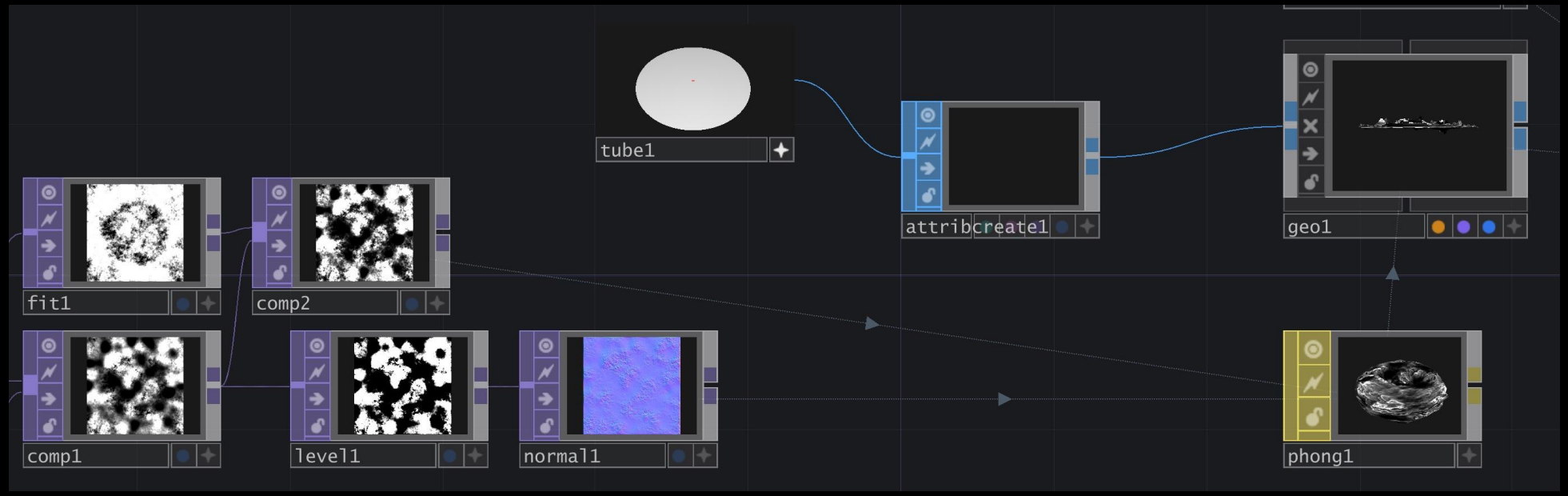


CASE: MAIN HALL SITUATION RENDER BREAKDOWN

- Main hall model
- Camera with human eye focal length and aperature
- Light for projection
- Light for ambient
- Geometry comp
- Render top
- Tilt shift effect tilted up



MATERIALS AND NORMAL MAPPING



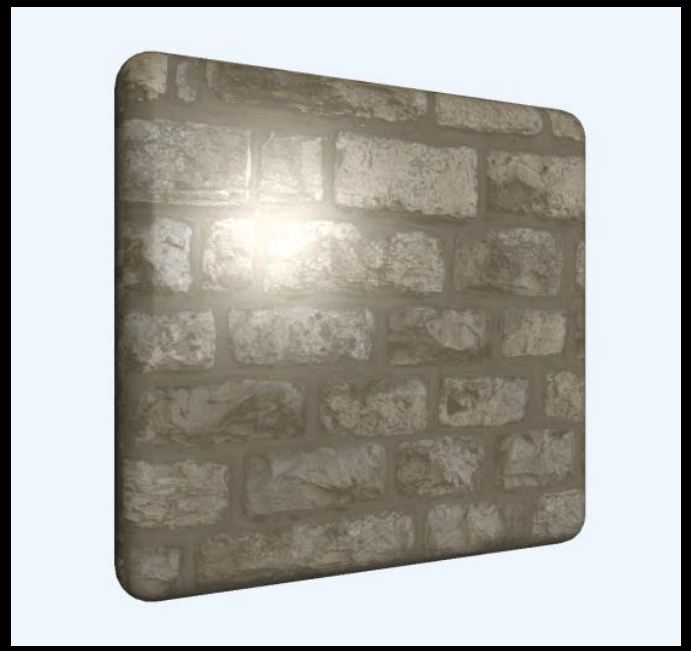
MATERIALS AND NORMAL MAPPING

- So far we have just been working with blank geometry and projecting upon them. In the first class Operator oversight we also briefly brushed upon the fact that you can assign materials onto geometry.
- Material allows you to transform the blank geometry into something that looks more like a real life material. Or not, depending on the effect you're looking for.
- Touchdesigner also allows you to assign Normal Maps made up from images or videos which you can import or create generatively inside Touchdesigner.

DIFFERENCE MATERIAL AND NORMAL MAP

MATERIAL

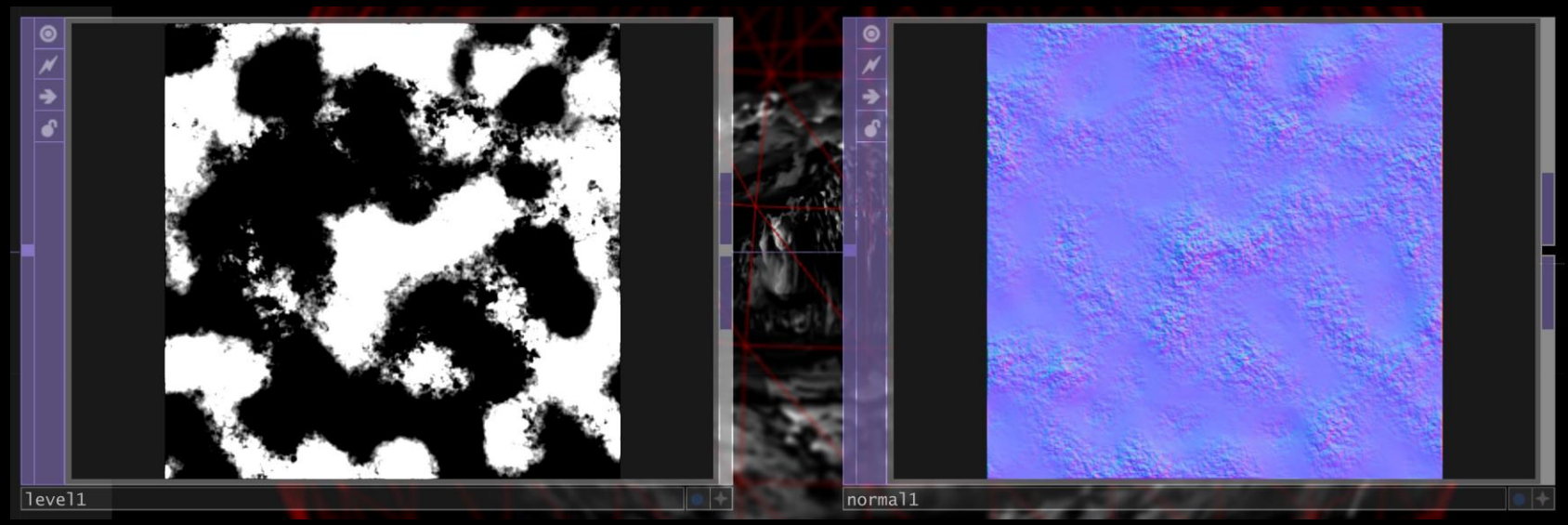
JUST THE IMAGE OF THE TEXTURE YOU WANT THE GEOMETRY TO HAVE. IT HAS NO DEPTH INFORMATION, AND IT JUST WRAPS AROUND THE GEOMETRY



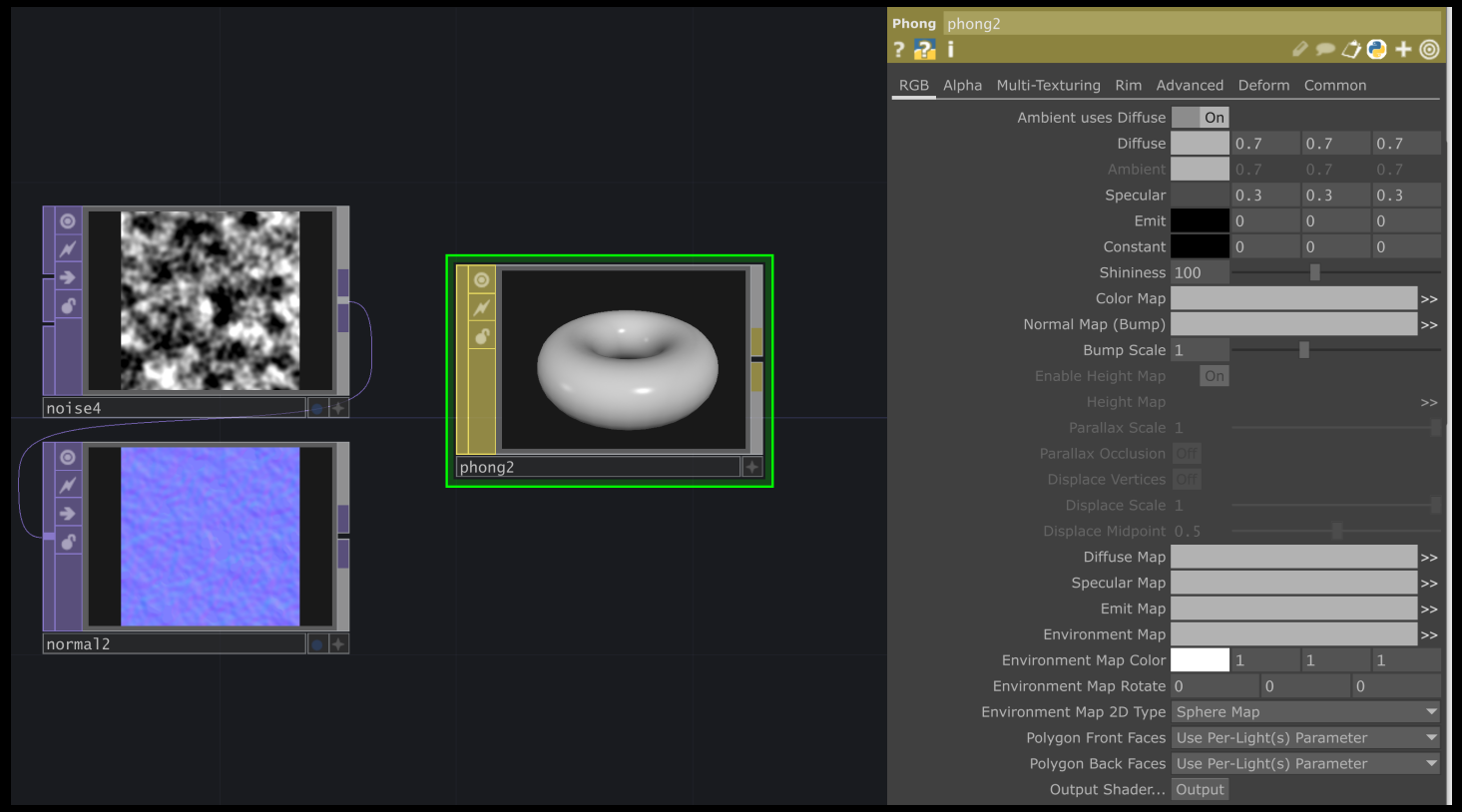
MATERIAL + NORMAL MAP

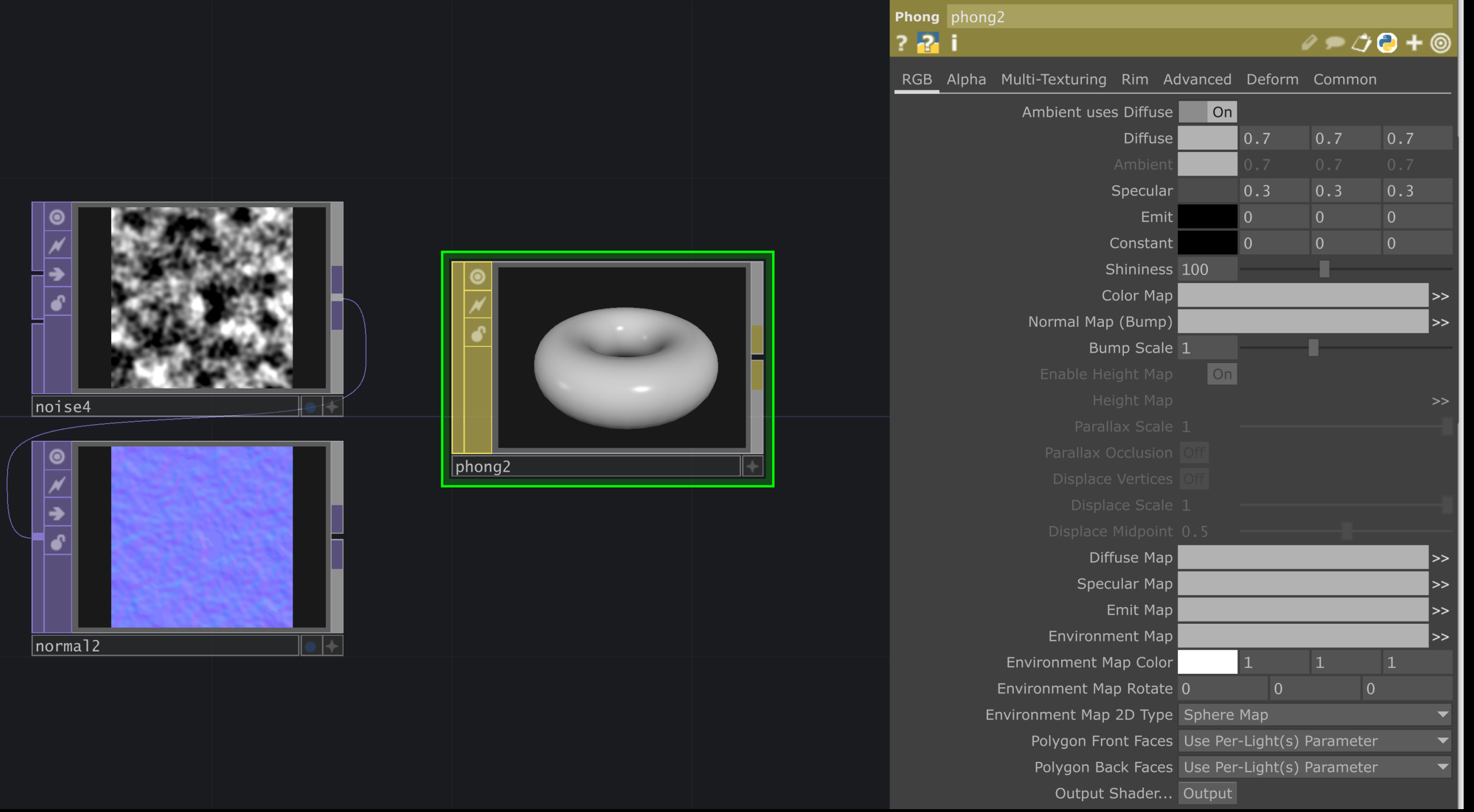
THE NORMAL MAP ADDS DEPTH INFORMATION TO THE MATERIAL GIVING THE ILLUSION OF DEPTH THROUGH LIGHTING AND REFLECTION. WHEN YOU LOOK CLOSELY, YOU'LL SEE THAT THE SURFACE IS STILL FLAT.

- A normal map in Touchdesigner is part of the TOP domain so you'll also find it there.
- The fact that it is part of the TOP domain allows you to easily derive normal maps from any TOP network you have going on.
- Normal maps are usually referenced into a *PHONG MAT*.



PHONG MATERIAL




noise4
normal2
phong2
Phong
phong2
RGB
Alpha
Multi-Texturing
Rim
Advanced
Deform
Common
Ambient uses Diffuse
On
Diffuse
0.7
0.7
0.7
Ambient
0.7
0.7
0.7
Specular
0.3
0.3
0.3
Emit
0
0
0
Constant
0
0
0
Shininess
100
Color Map
Normal Map (Bump)
Bump Scale
1
Enable Height Map
On
Height Map
Parallax Scale
1
Parallax Occlusion
Off
Displace Vertices
Off
Displace Scale
1
Displace Midpoint
0.5
Diffuse Map
Specular Map
Emit Map
Environment Map
Environment Map Color
1
1
1
Environment Map Rotate
0
0
0
Environment Map 2D Type
Sphere Map
Polygon Front Faces
Use Per-Light(s) Parameter
Polygon Back Faces
Use Per-Light(s) Parameter
Output Shader...
Output

TouchDesigner 2023.11880: C:/Users/Admin/Documents/Touchdesigner_basic/3D-GEOMETRY.toe*

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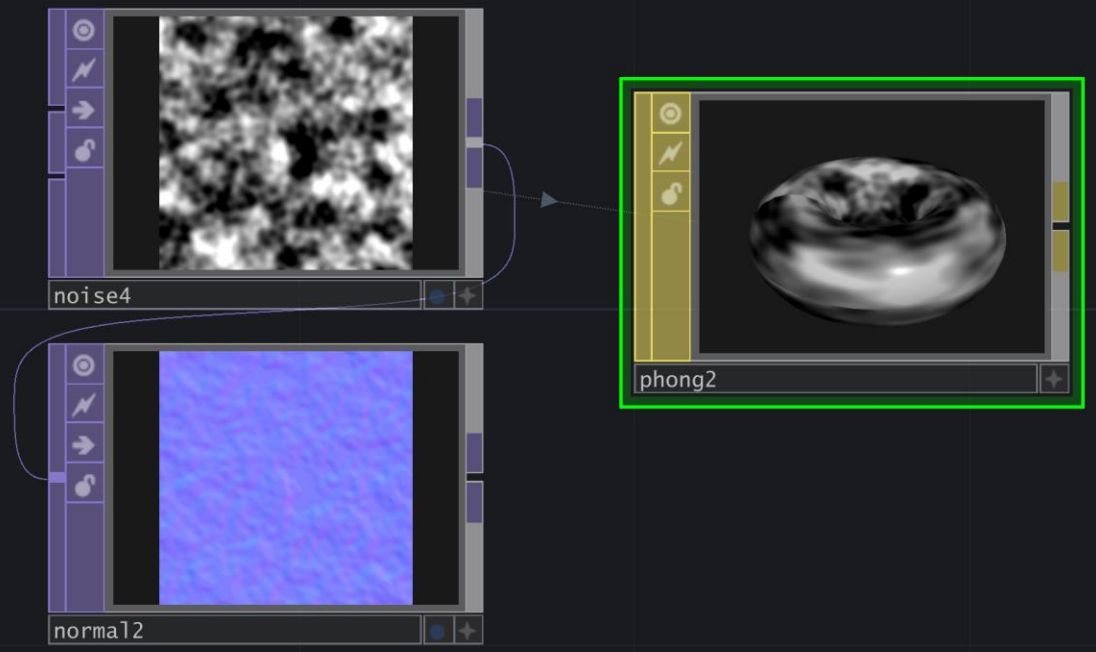
Pane Layout New Layout

/ project1 / >>



Phong phong2

RGB Alpha Multi-Texturing Rim Advanced Deform Common

Ambient uses Diffuse	On			
Diffuse		0.7	0.7	0.7
Ambient		0.7	0.7	0.7
Specular		0.3	0.3	0.3
Emit		0	0	0
Constant		0	0	0
Shininess	100			
Color Map	noise4			>>
Normal Map (Bump)				>>
Bump Scale	1			
Enable Height Map	On			
Height Map				>>
Parallax Scale	1			
Parallax Occlusion	Off			
Displace Vertices	Off			
Displace Scale	1			
Displace Midpoint	0.5			
Diffuse Map				>>
Specular Map				>>
Emit Map				>>
Environment Map				>>
Environment Map Color		1	1	1
Environment Map Rotate	0	0	0	
Environment Map 2D Type	Sphere Map			
Polygon Front Faces	Use Per-Light(s) Parameter			
Polygon Back Faces	Use Per-Light(s) Parameter			
Output Shader...	Output			

Start: 1 End: 600
RStart: 1 REnd: 600
FPS: 60.0 Tempo: 120.0
ResetF: 1 T Sig: 4 4

1 51 101 151 201 251 301 351 401 451 501 551 600

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Range Limit Loop Once

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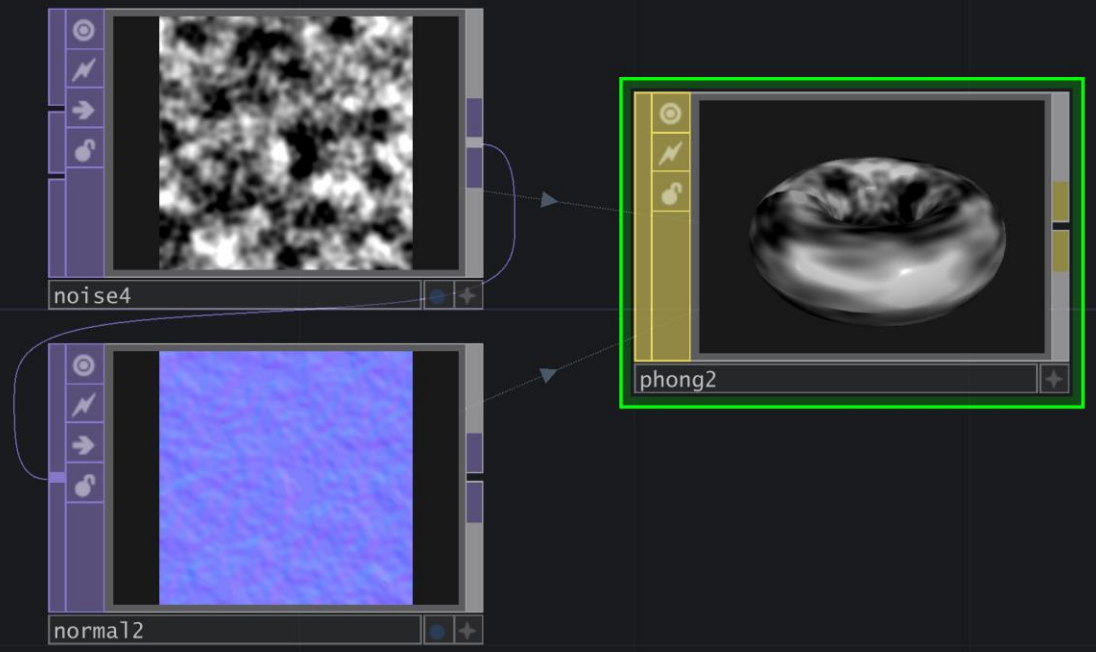
Pane Layout New Layout

/ project1 / >>



Phong phong2

RGB Alpha Multi-Texturing Rim Advanced Deform Common

Ambient uses Diffuse	On			
Diffuse		0.7	0.7	0.7
Ambient		0.7	0.7	0.7
Specular		0.3	0.3	0.3
Emit		0	0	0
Constant		0	0	0
Shininess	100			
Color Map	noise4			>>
Normal Map (Bump)	normal2			>>
Bump Scale	1			
Enable Height Map	On			
Height Map				>>
Parallax Scale	1			
Parallax Occlusion	Off			
Displace Vertices	Off			
Displace Scale	1			
Displace Midpoint	0.5			
Diffuse Map				>>
Specular Map				>>
Emit Map				>>
Environment Map				>>
Environment Map Color		1	1	1
Environment Map Rotate	0	0	0	
Environment Map 2D Type	Sphere Map			
Polygon Front Faces	Use Per-Light(s) Parameter			
Polygon Back Faces	Use Per-Light(s) Parameter			
Output Shader...	Output			

Start: 1 End: 600
RStart: 1 REnd: 600
FPS: 60.0 Tempo: 120.0
ResetF: 1 T Sig: 4 4

1 51 101 151 201 251 301 351 401 451 501 551 600

TimeCode Beats 00:00:00:06 7

Range Limit Loop Once

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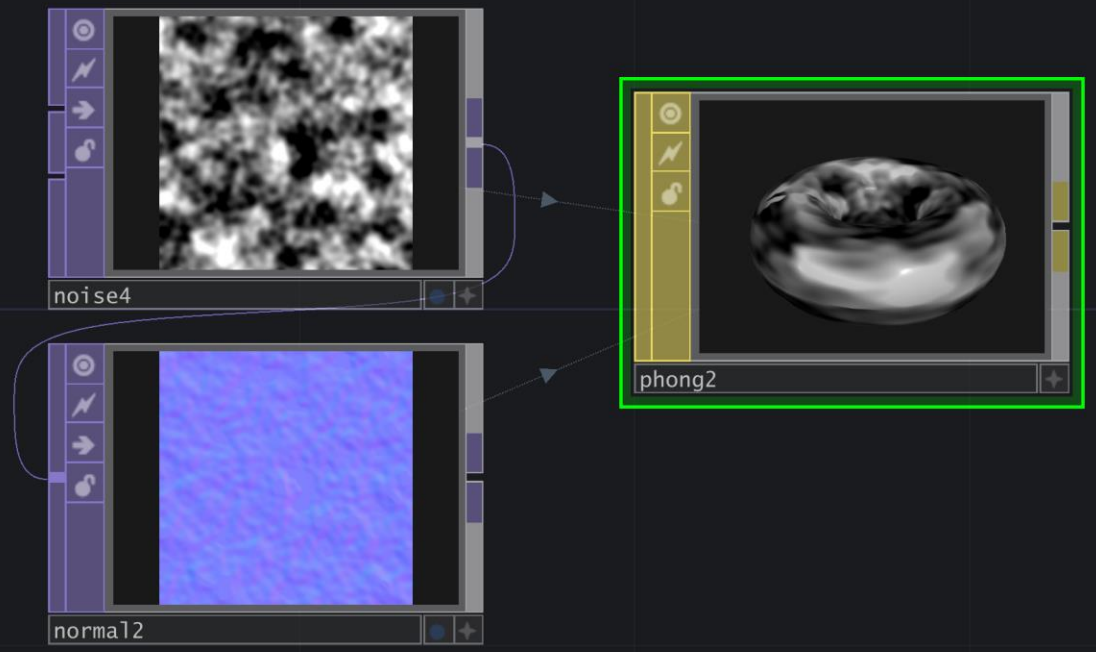
Pane Layout New Layout

/ project1 / >>



Phong phong2

RGB Alpha Multi-Texturing Rim Advanced Deform Common

Ambient uses Diffuse	On			
Diffuse		0.7	0.7	0.7
Ambient		0.7	0.7	0.7
Specular		0.3	0.3	0.3
Emit		0	0	0
Constant		0	0	0
Shininess	100			
Color Map	noise4			
Normal Map (Bump)	normal2			
Bump Scale	1			
Enable Height Map	On			
Height Map	noise4			
Parallax Scale	1			
Parallax Occlusion	Off			
Displace Vertices	Off			
Displace Scale	1			
Displace Midpoint	0.5			
Diffuse Map				
Specular Map				
Emit Map				
Environment Map				
Environment Map Color		1	1	1
Environment Map Rotate	0	0	0	
Environment Map 2D Type	Sphere Map			
Polygon Front Faces	Use Per-Light(s) Parameter			
Polygon Back Faces	Use Per-Light(s) Parameter			
Output Shader...	Output			

Start: 1 End: 600
RStart: 1 REnd: 600
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ResetF: 1 T Sig: 4 4

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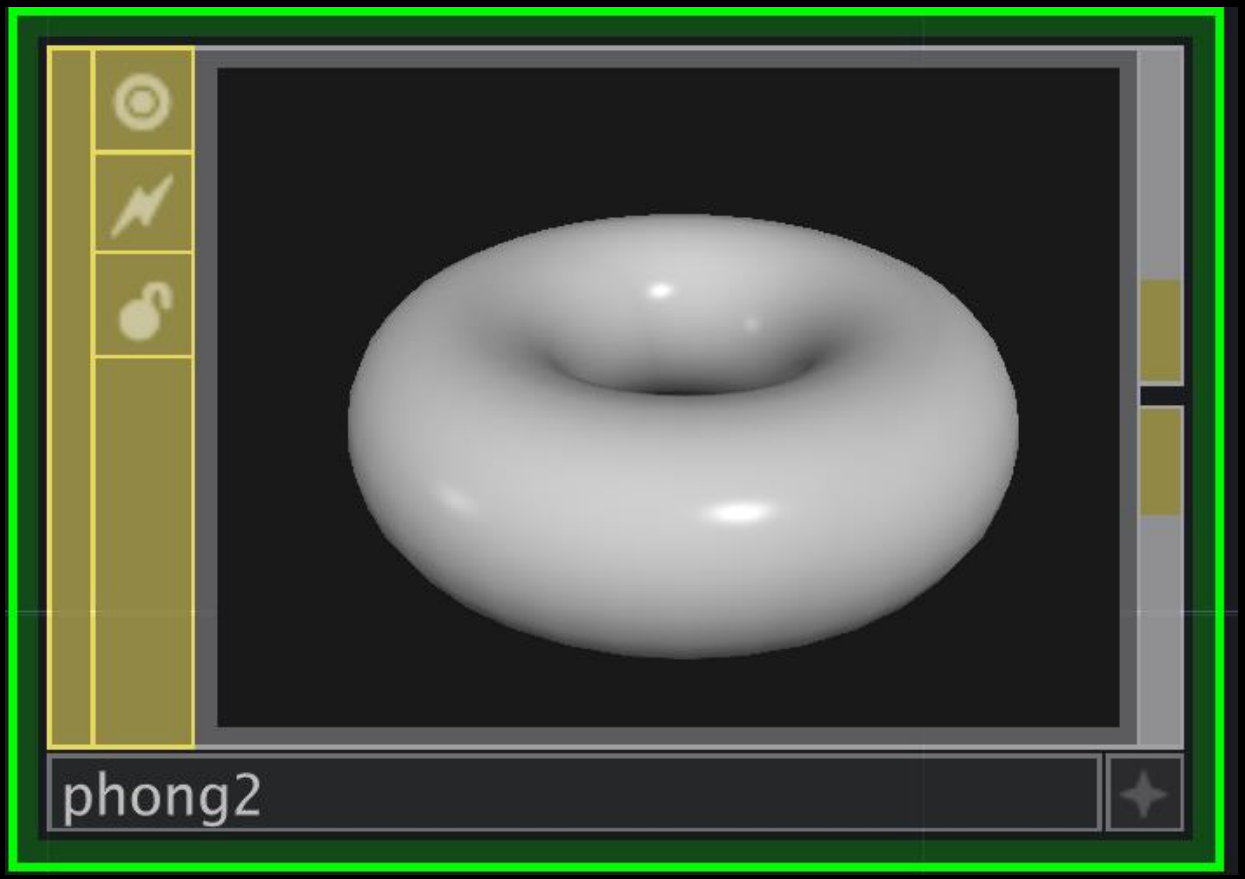
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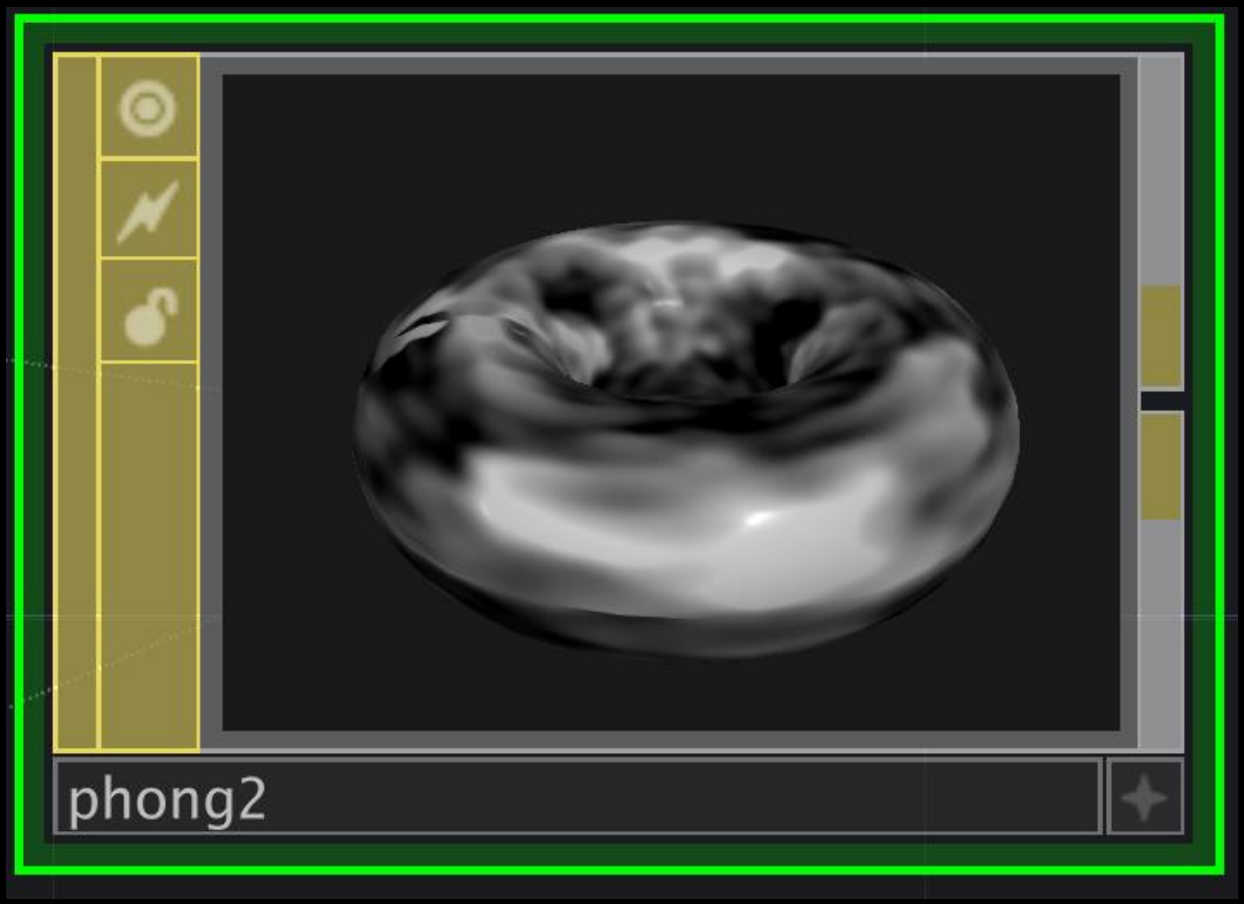
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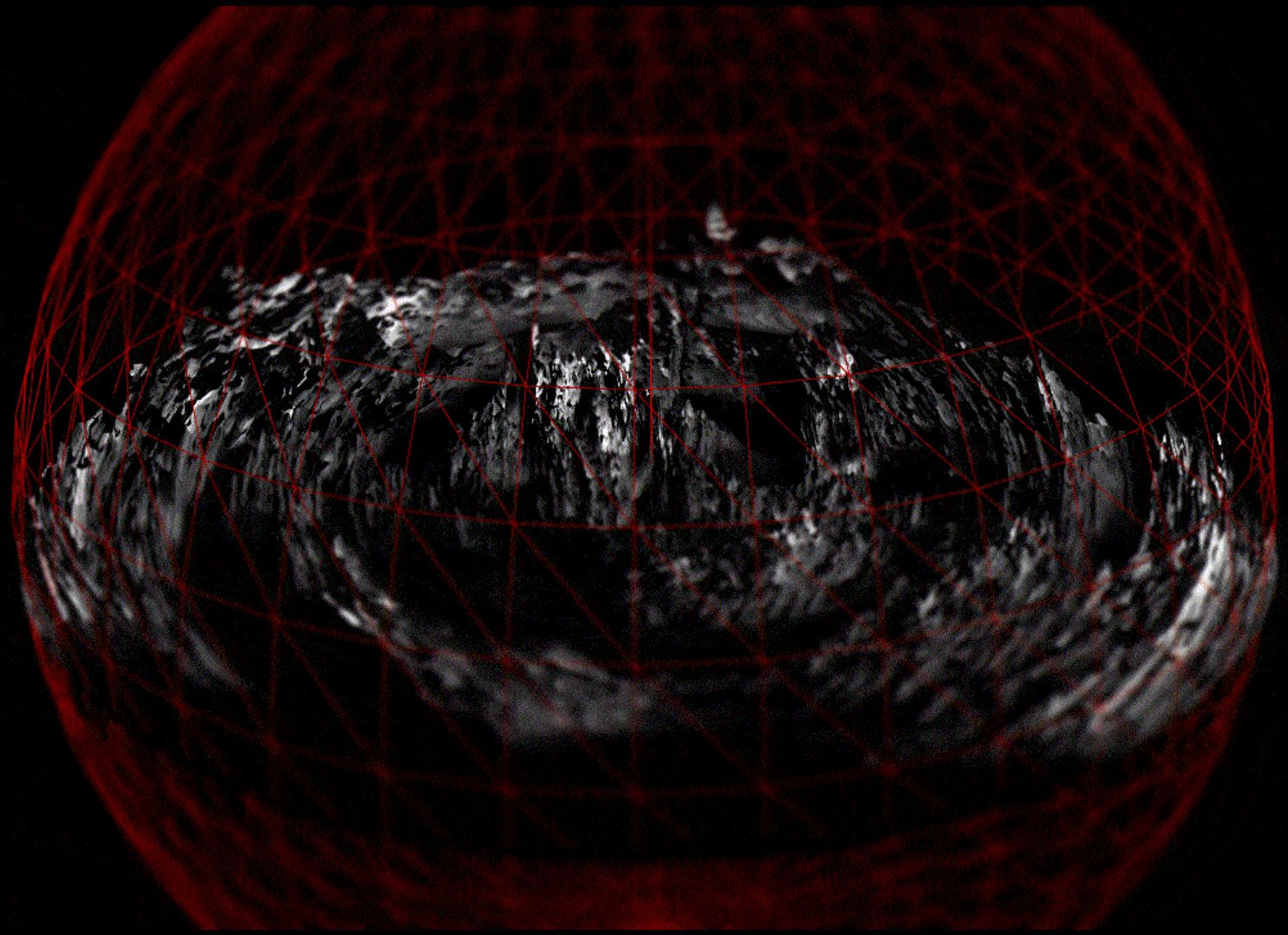
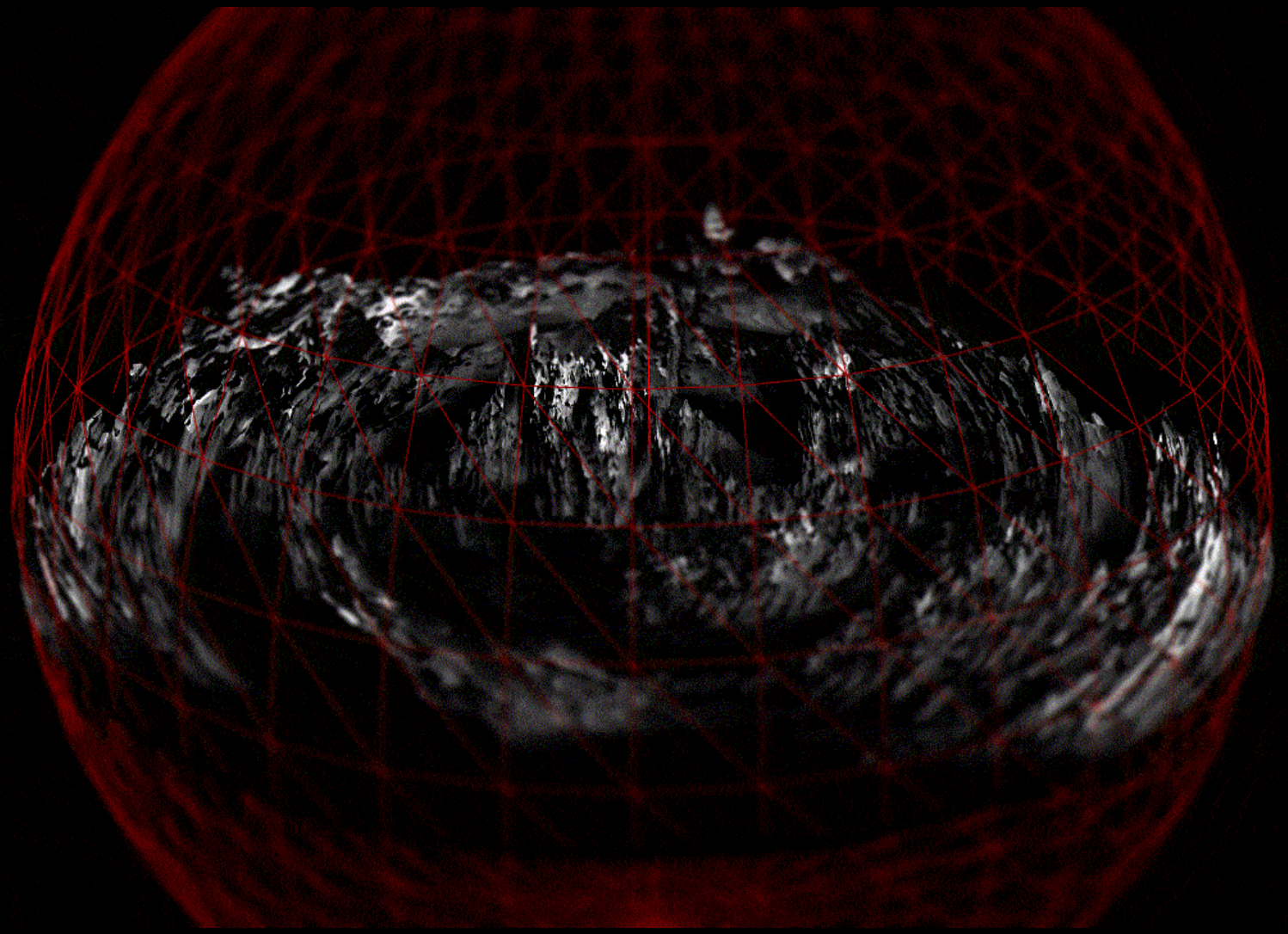
CASE: MAGIC SPHERE



CASE: MAGIC SPHERE BREAKDOWN

- A normal mapping disc
- A source image for normal mapping
- Displacement of normal map
- Color map for normal map
- Wireframe material
- Sphere with wireframe material
- Displacement on the wireframe sphere
- Automated rotation of sphere and disc
- Camera
- Light
- Geometry
- Render
- Tilt shift
- Saving it as a movie/GIF