Kyle Lin, October 22, 2022
Houdini Version 19.5.303

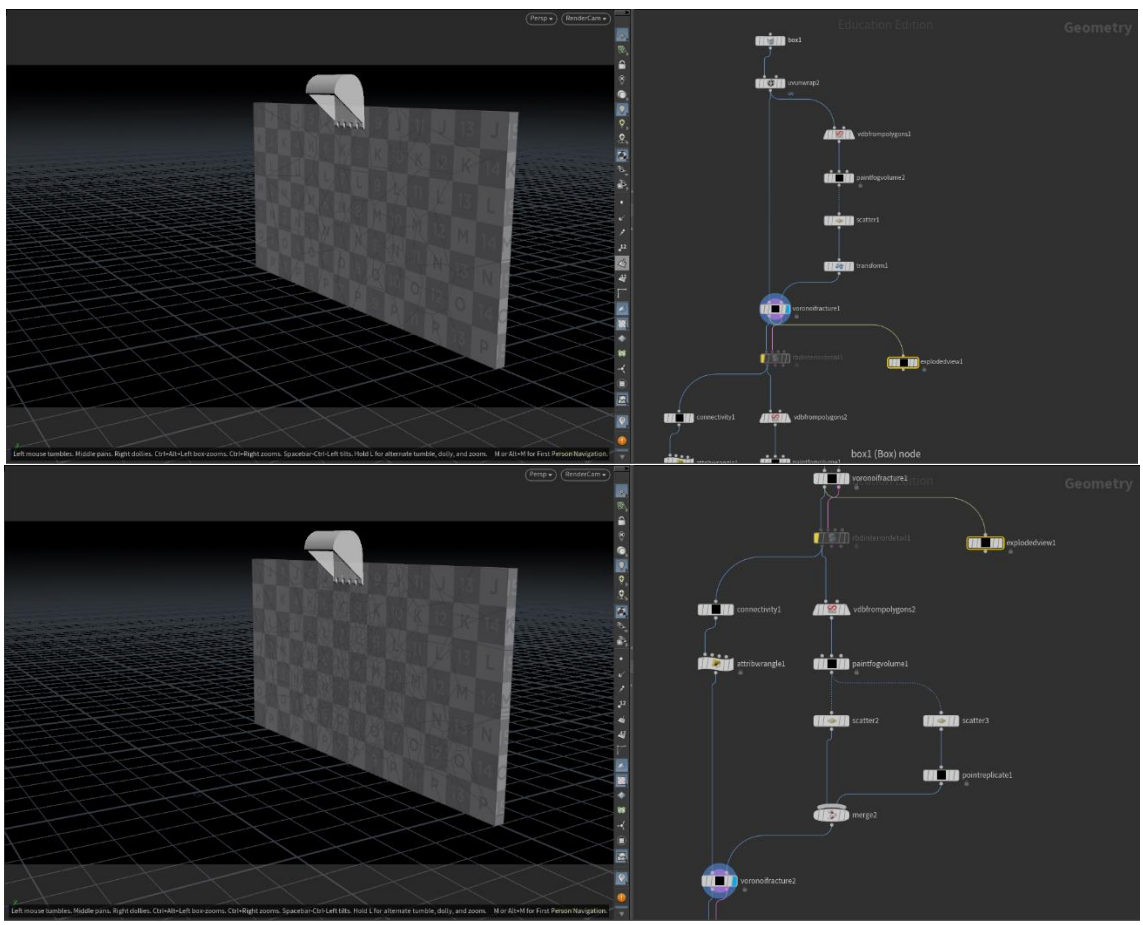
# Exercise 4 – Wall Destruction

## Important statistics

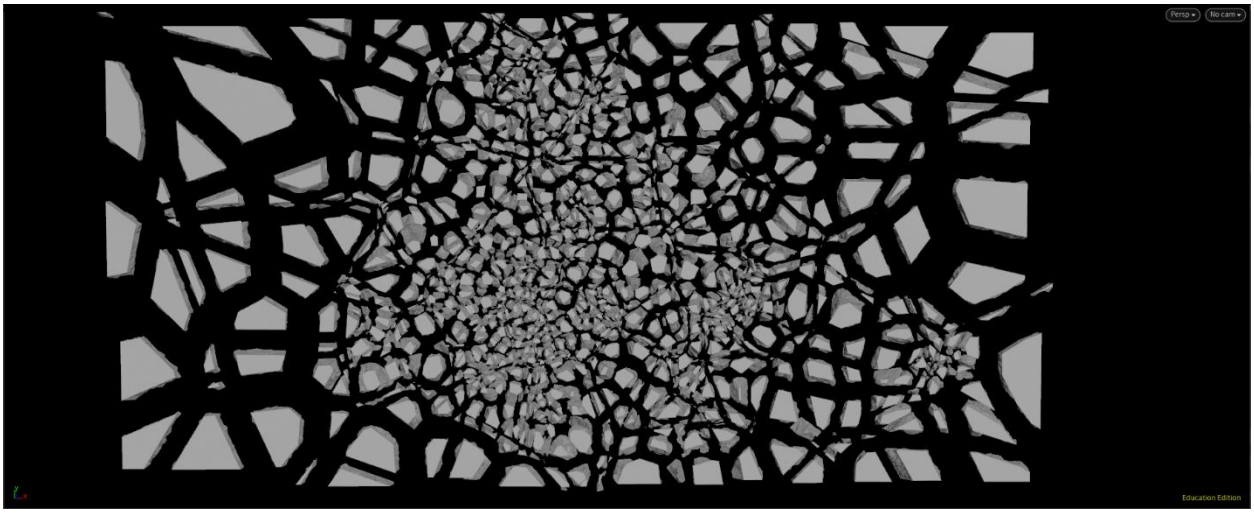
| | |
|---|---|
| Renderer | : Redshift |
| Resolution | : 1920 * 1080 |
| Sample Quality | : High |
| Average Render Time | : 3.8 mins |
| Number of Lights | : 1 HDRI dome light |

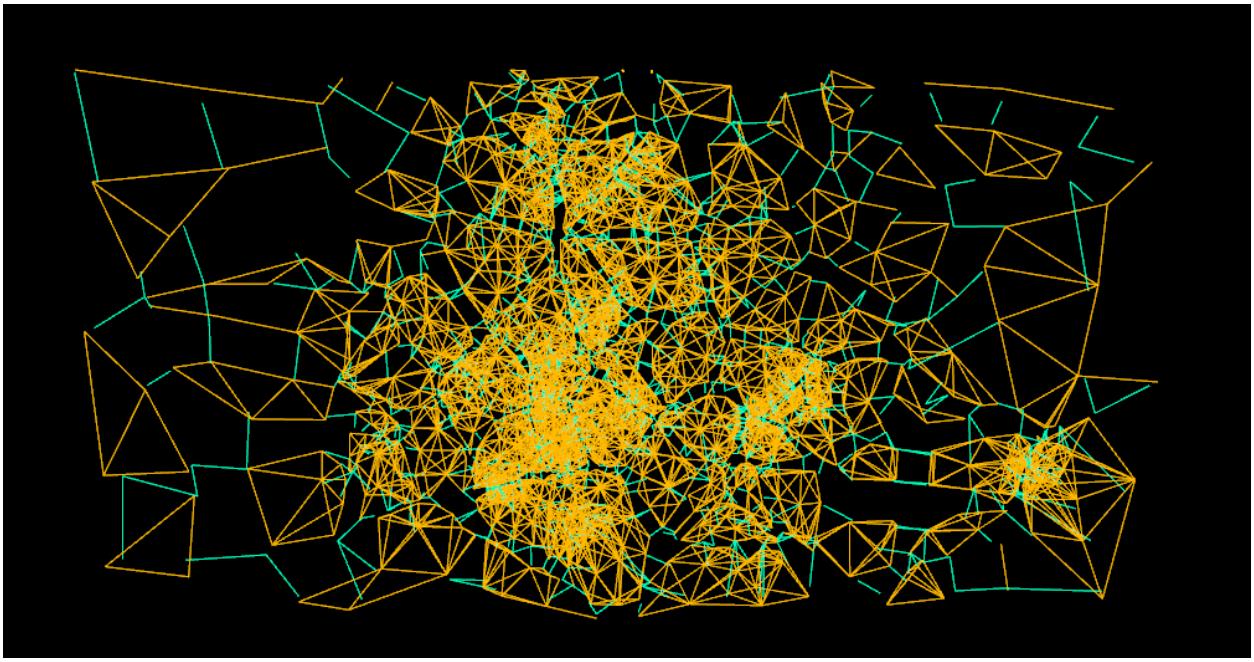
# Technical Guide


# Wall

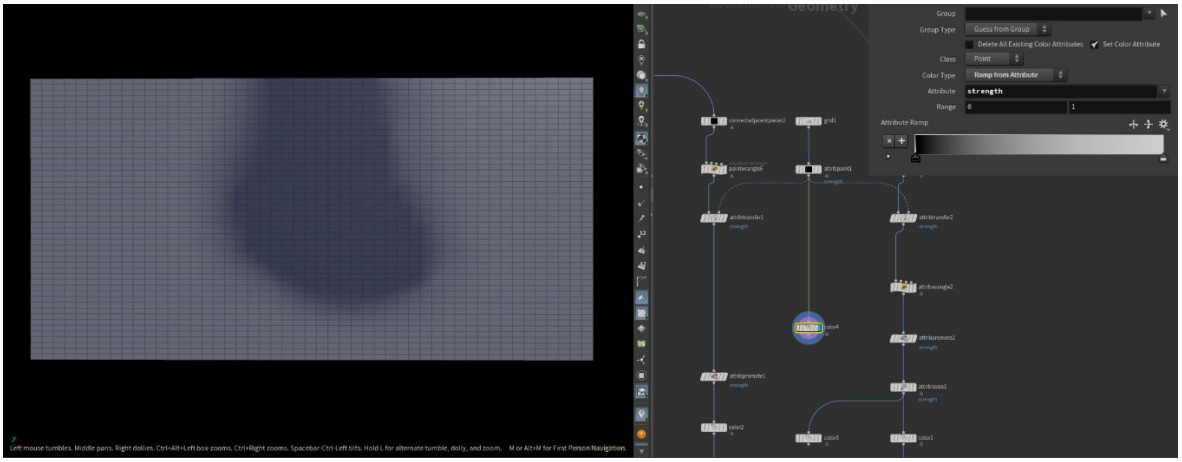


In order to give have more control on how I want the destruction to look, I fracture the wall twice and then used “RBD interior detail” node to create details inside the fractures. For preparing the Voronoi fracture, I used the “volume paint fog” node to scatter points in the path that the digger is going to go through. I also used a “point replicate” to get smaller pieces in certain places.

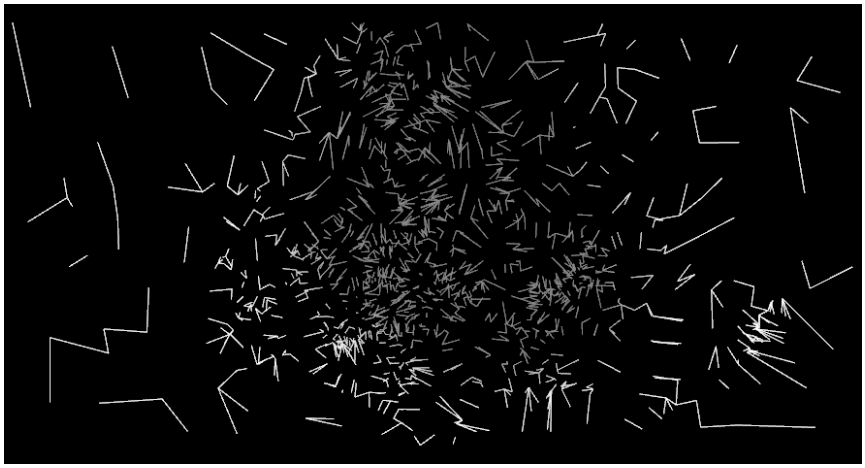


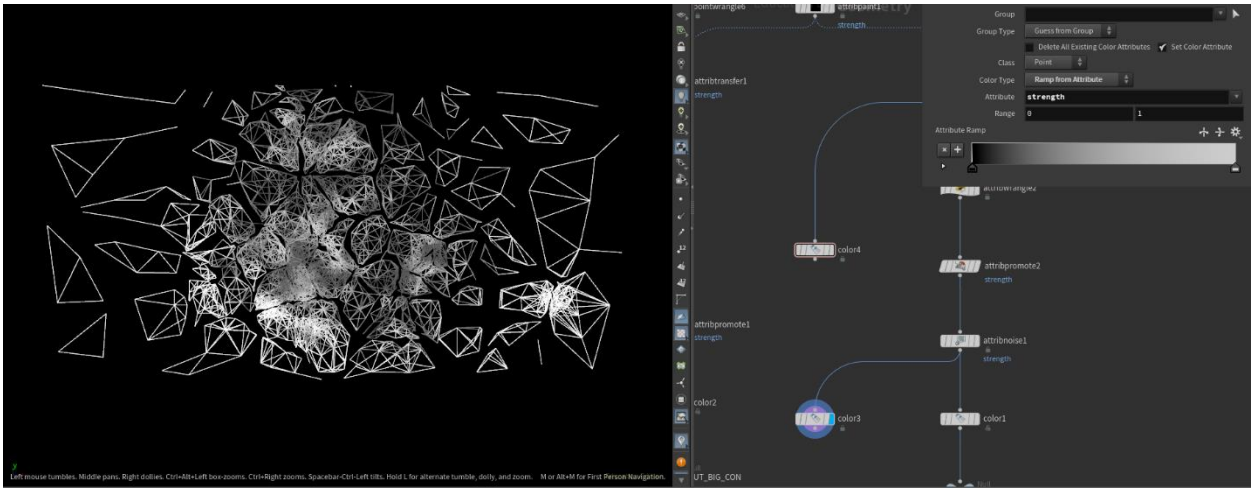



The orange color constraints are the constraints connecting smaller pieces together, and the green constraints are the constraints holding the bigger pieces together. Orange constraints are generated by the Voronoi fracture node. The green constraints are created with a “connect adjacent pieces.”

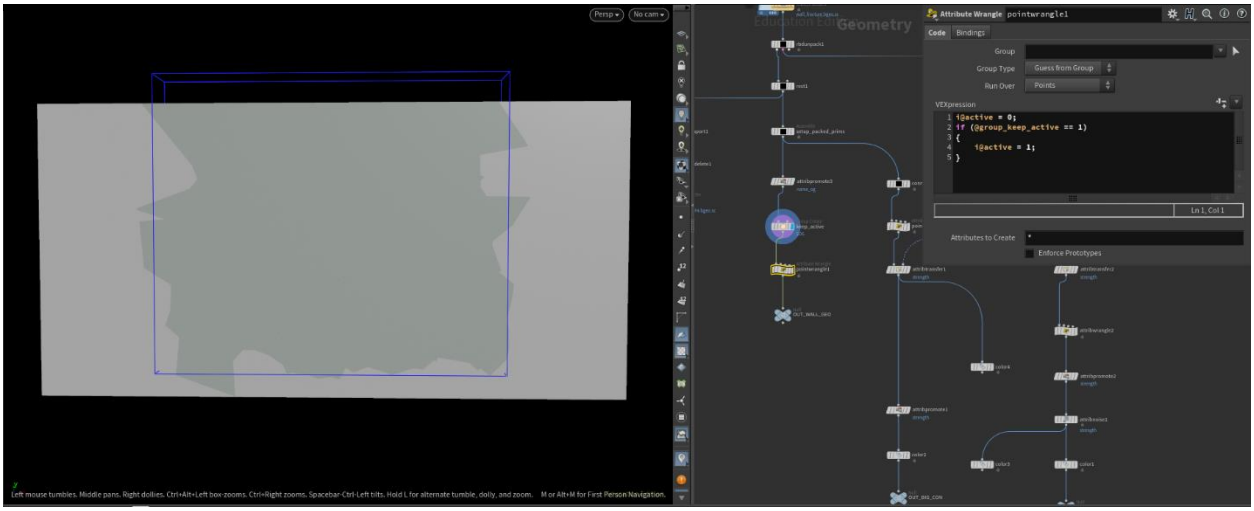



Instead of painting on the constraints, I painted the strength attribute onto a plane and then transfer the attribute back to the constraints. In this case, I don’t need to worry about changing the fracture sine that will change the point number and massed up the attribute being painted. However, this technique might only work good with planer geometry, and not as good for 3-dimensional object.

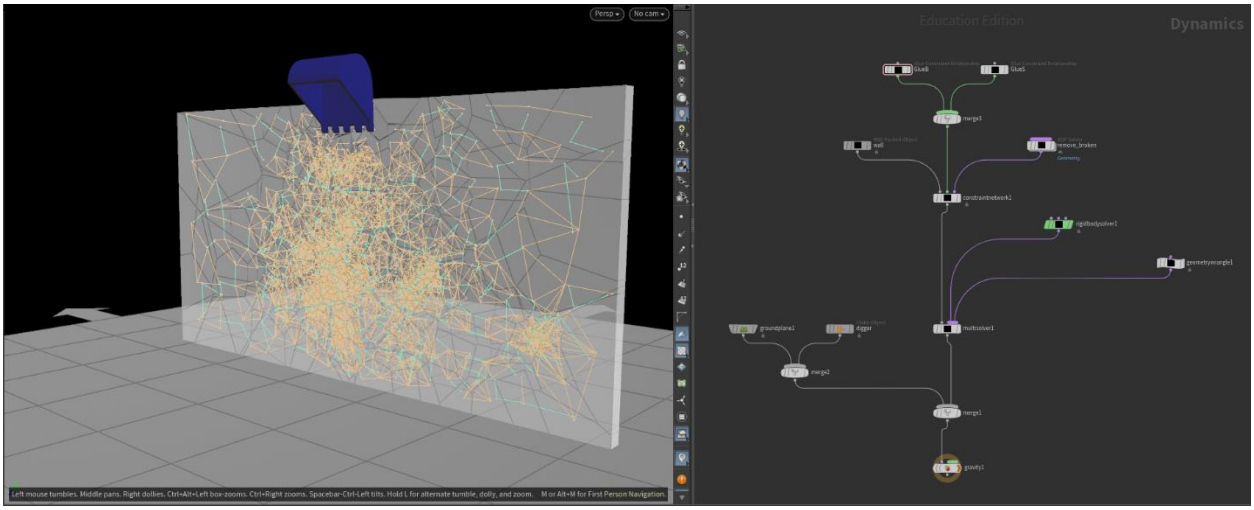





Additionally, I remapped the strength value from attribute paint for the small piece constraints from 0.25-1 to 0.5-1.05, so there's less the differences in strength. I also added a noise to the attribute to make some parts stronger and some weaker to get bigger and smaller chunks.

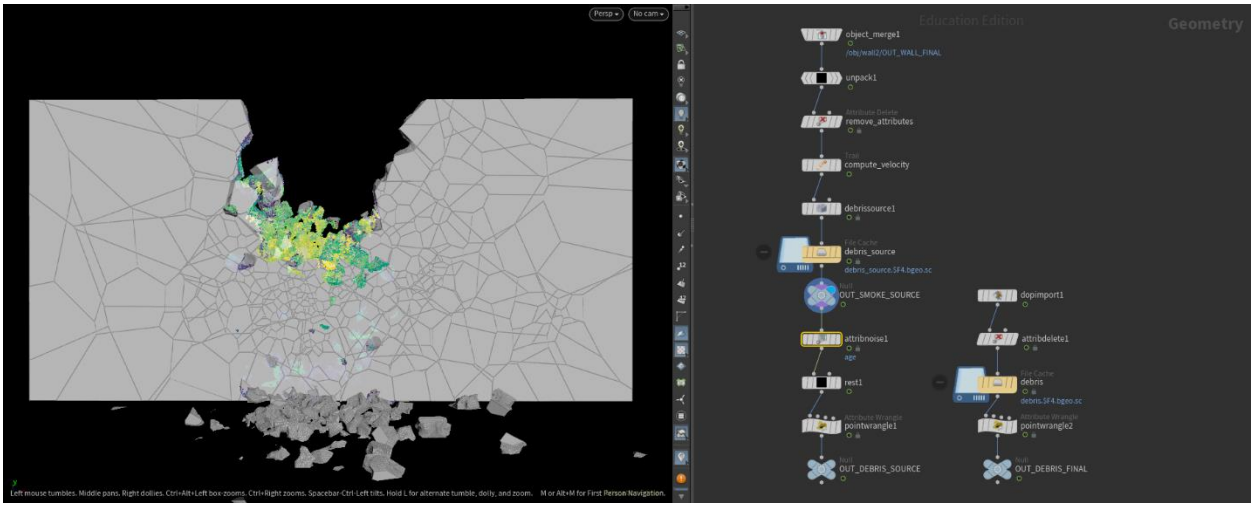



I also used a group and wrangle node to make only the pieces in the middle active, so the other parts will not move and the wall won't fall down after the digger hits.

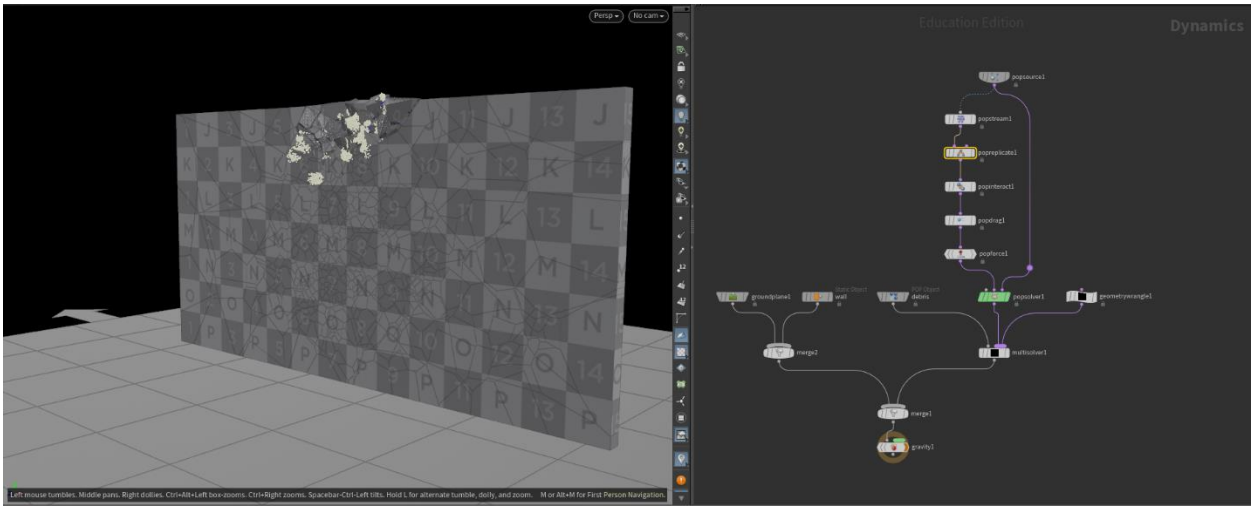



For wall simulation, I made the green constraints easier to break than the orange constraints. Therefore, bigger pieces will break first before the orange constraints break, so I can have some variation when the wall is being destroyed. Strength of the green constraints is set to 1750, and the orange is set to 6000.

# Debris

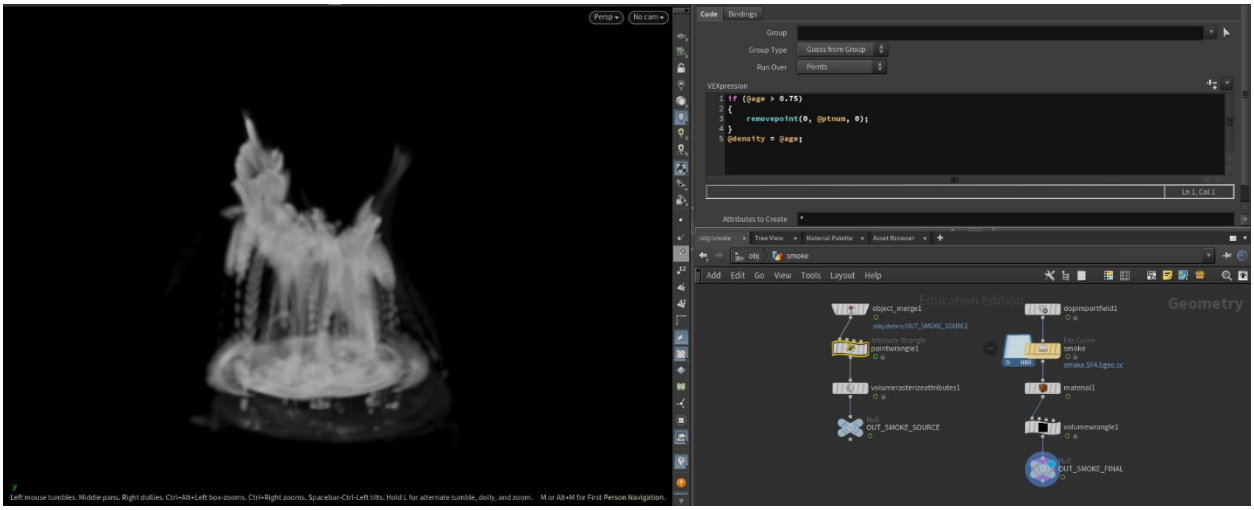



For debris, I cached the debris source with 1 second life, and then manipulate the amount of source points afterwards, so I have more control and no need to keep caching. I add some noise to the age of the source points and used a point wrangle to delete points above a certain age.

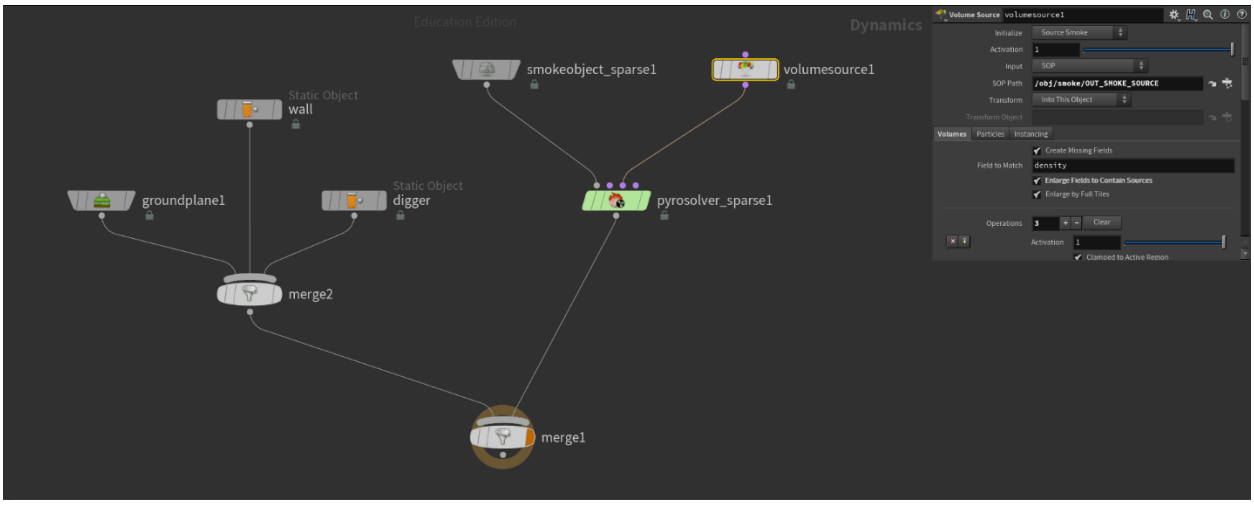



I didn’t change a lot in the DOP network for the debris simulation other than reduce the number of particles and change it to impulse activation.

# Smoke




I used the same technique as the debris to control the number and age of source point and source from the debris source. I also used a wrangle node to make the density equal to the age.




For the simulation, I adjusted the density and velocity scale by 5, and added some viscosity and disturbance.

## Problems Encountered

I had encountered some problems as I was making the destruction. The first thing is I was trying to do too much in a short a mount of time especially this is my first time making a RBD destruction. I was trying to create a concrete wall with rebars inside of it. However, things didn’t turn out as I was expected when I put the rebar and the wall together. I need to understand how the name and constraints work in Houdini more in order to solve the issue as professor suggested. The name is causing the constraints not working or import properly which is causing the wall exploding when digger hits the wall.

Another issue I had is also about naming constraints. After giving up the rebar idea, I tried to create a simple concrete wall breaking. However, I wasn’t happy with how the pieces are breaking. Therefore, I tried out the method I am using right now. It wasn’t working at first because I got the constraint for bigger pieces from the first Voronoi fracture. The constraints were not imported because the points are different.

The last problem I had was just tweaking the constraint strength to make them break as I wanted. I also had to reanimate the digger. Originally, I had the digger push down in the middle from the top of the wall, and the digger also moved a lot faster. These were causing the wall exploding no matter the strength of the constraint, or the digger will just pass through the wall.

## Reference

https://www.youtube.com/watch?v=0y3f1_M2tYI

https://www.youtube.com/watch?v=DMomToOWUfs