Cute Fractal
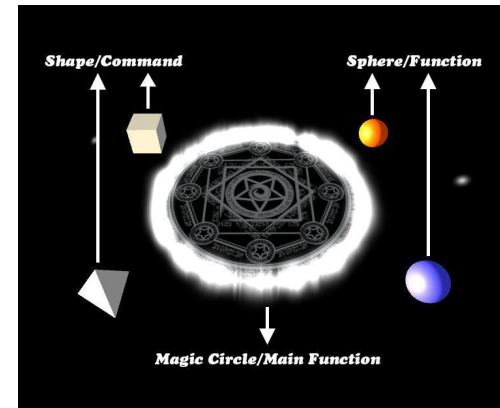
Functions and Recursion

Guest Walkthrough

Play Space
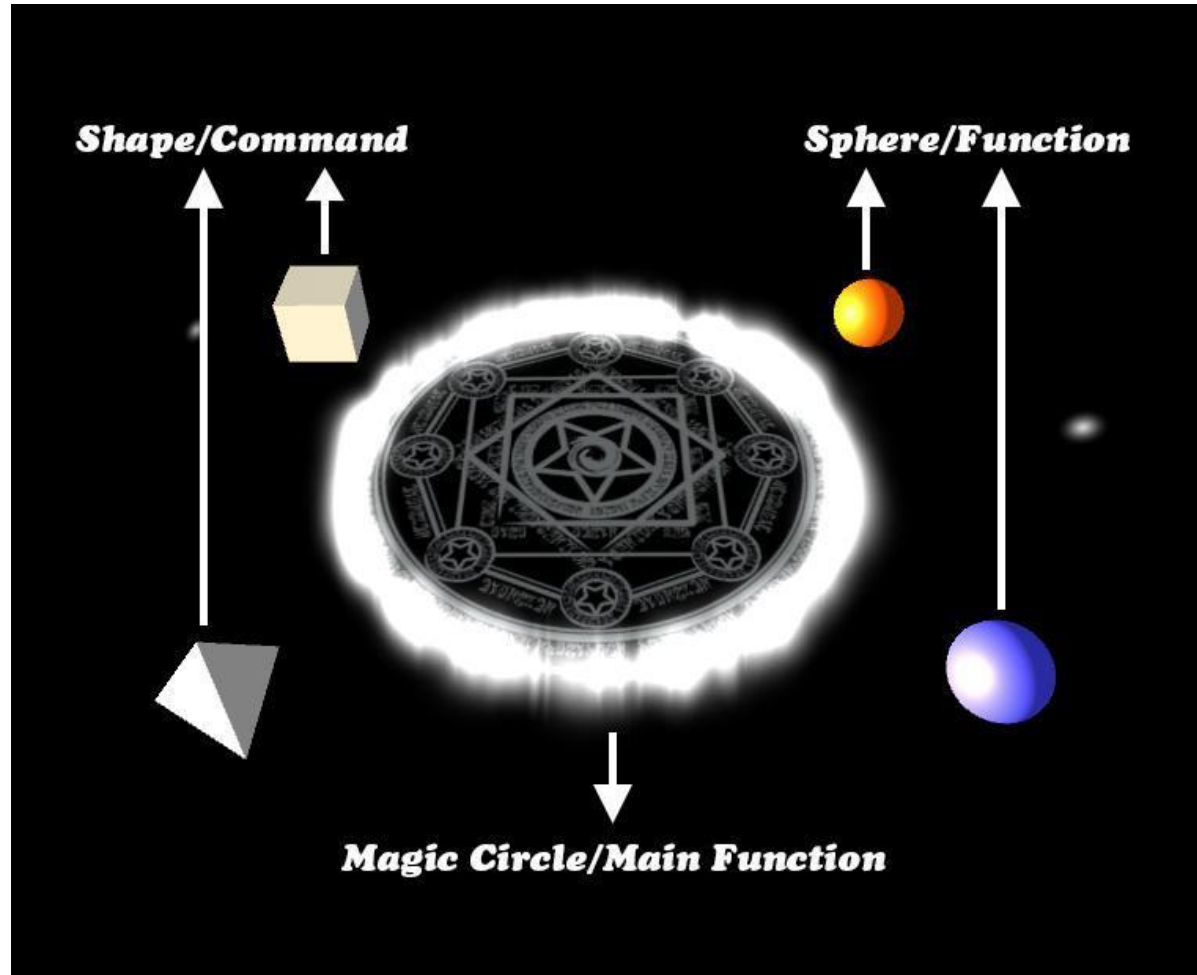
Programming Concepts

▸ The magic circle in the center represents the main function.

  ▸ This is what defines your fractals. You can grab the spell out of it and release the magic to create fractals.

▸ The spheres(blue and orange) represent functions.

  ▸ As they are functions, you can define them, and you can use them to define other functions as well.

▸ The white shapes(triangular pyramid and cube) represent commands.

  ▸ You can use them to define functions.

  ▸ Each of them describes a new layer of shapes on the fractal.

Gestures

- Grab:
    - When you put your right hand close enough to any object(magic circle/ shapes/ spheres), a golden circle will appear on the object. Now you can press and hold your right index finger to grab an instance of the shape and hold it in your hand. If you grab from the magic circle, you can get your magic spell.

    - Release shapes or spells by releasing your right index finger.

    - If you release a function or a shape to a function, you will add a new command to the function. If you release a spell, you will create the fractal defined by the shapes in the magic circle at the place you release. If you release something other than a spell in the air, it will disappear.

- Cancel:
    - When you put your left hand close enough to any function(magic circle/spheres), a red circle will appear on the object. Now you can press your left index finger to clean that function.

- Remove Fractal:
    - Whenever you put any hand close to the fractal you created, you can press the joystick to remove the fractal.
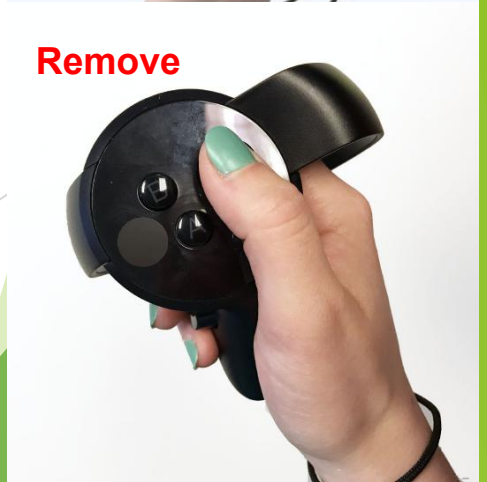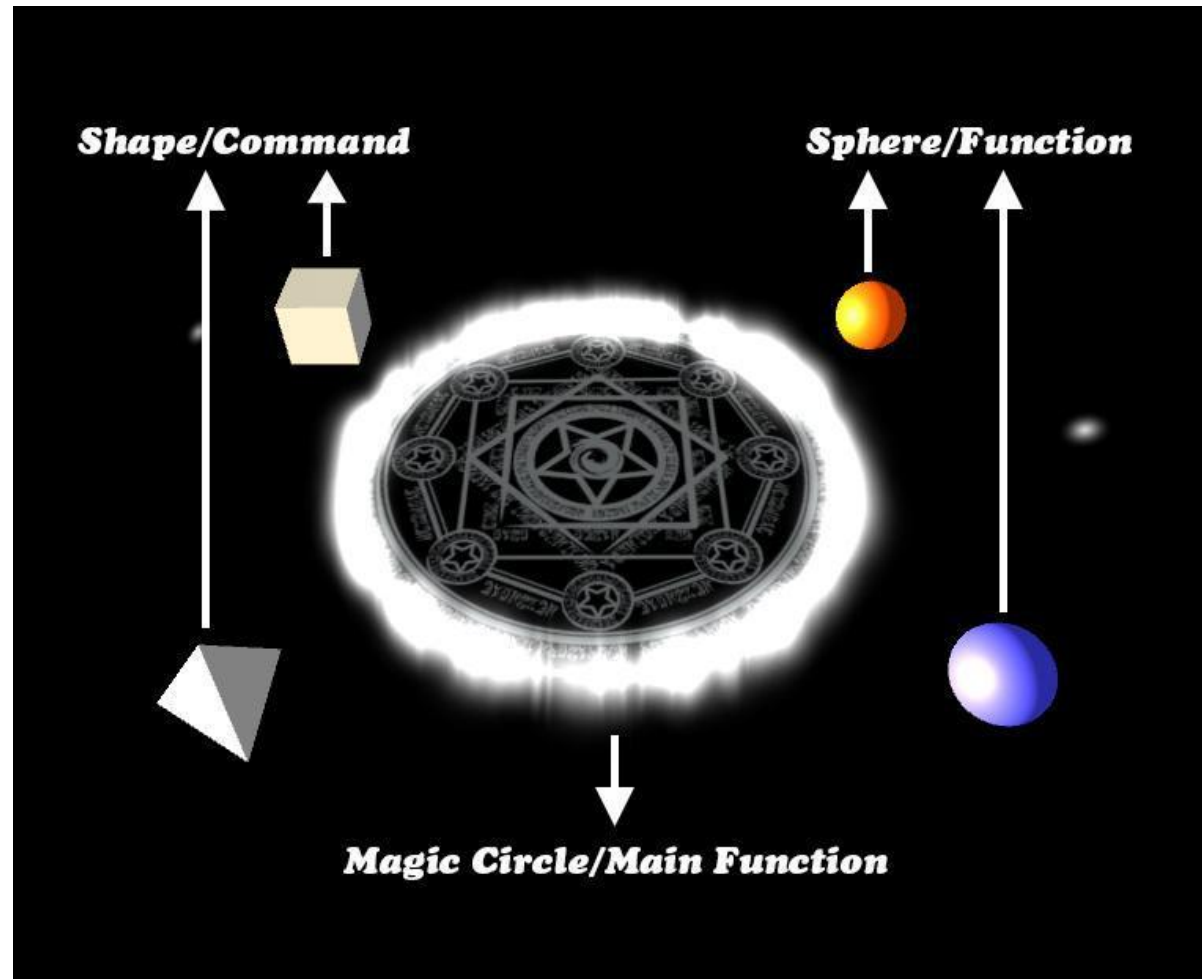
Grab

Cancel

Remove

Walkthrough – Step1

▸ Set up your Oculus headset and Oculus touch.

Note: Hold both touches while playing! Oculus will not work unless both controllers are visible to the sensors.

▸ Start the prototype.

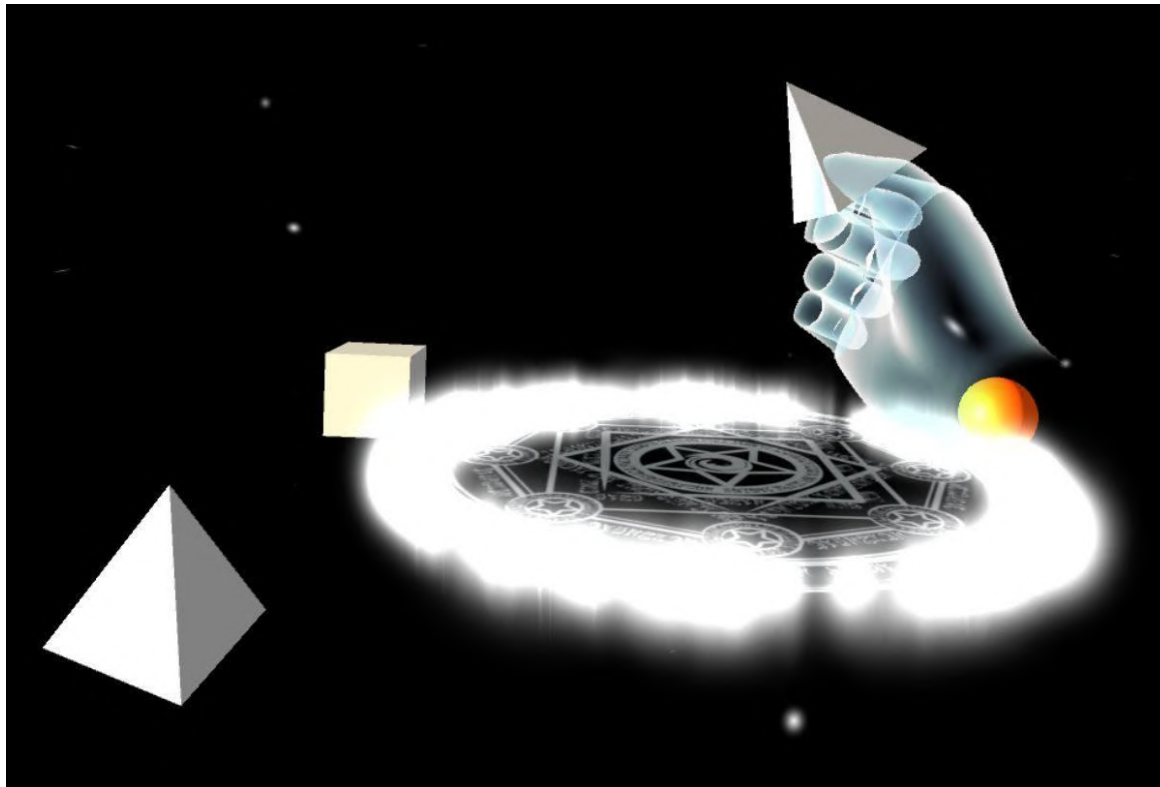▸ Move so you can see the whole scene in front of you (shown here).

Walkthrough – Step2.1

Now let's try to put a triangular pyramid into our magic circle.

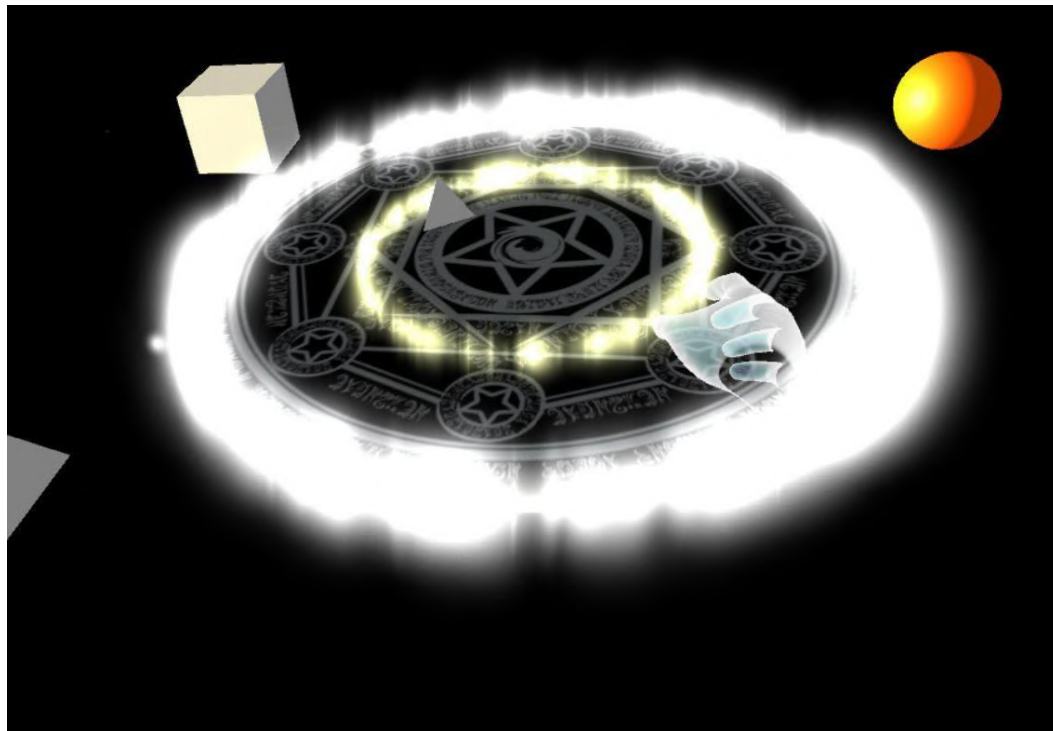▸ Move your right hand close to the pyramid until you see a golden circle.

Walkthrough – Step2.2

▸ **Press and hold** with your right **index finger**, then you should see an instance of the pyramid in your right hand.

Walkthrough – Step2.3

- Put your right hand close to the magic circle until you see a golden circle and release your right index finger.

- If you see a small pyramid floating on the magic circle, you have successfully put a pyramid into the magic circle and added that layer to your fractal spell.
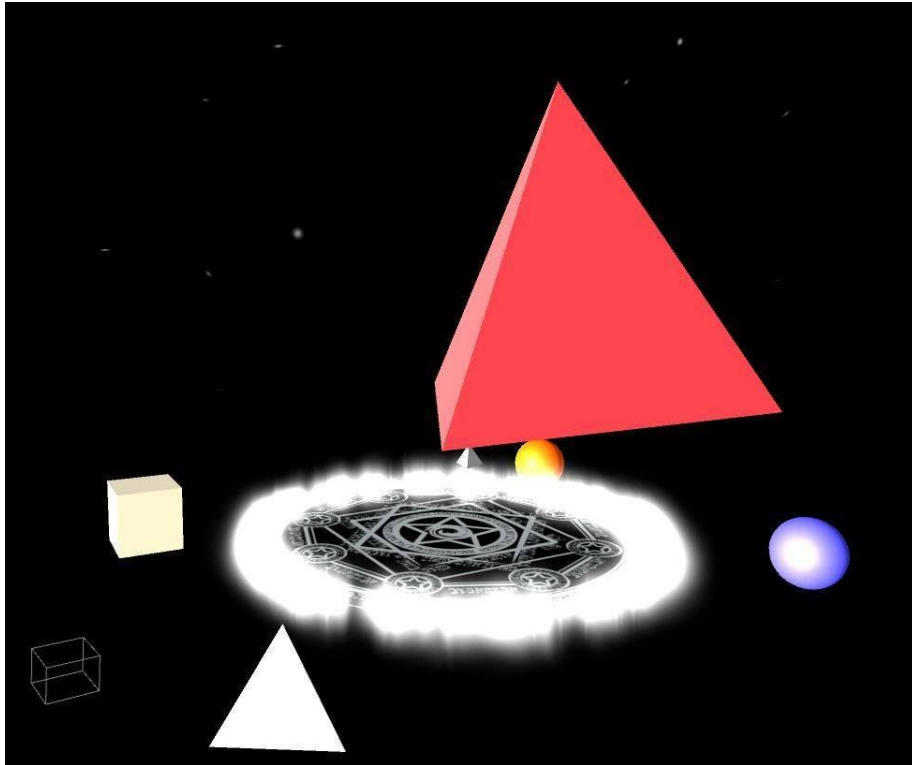
Walkthrough – Step3.1

Now let's try to create a fractal.

▸ Grab from the magic circle just like you grabbed the pyramid (Move your right hand close to the magic circle until you see the golden circle, then press and hold your index finger).

▸ You should see a flame effect surrounding your hand (your spell).

Walkthrough – Step3.2

▸ Hold the spell and move your right hand to the place you want to create the fractal. Then release your right index finger.

▸ If you create a pyramid, you just successfully created a fractal.

Walkthrough – Step4
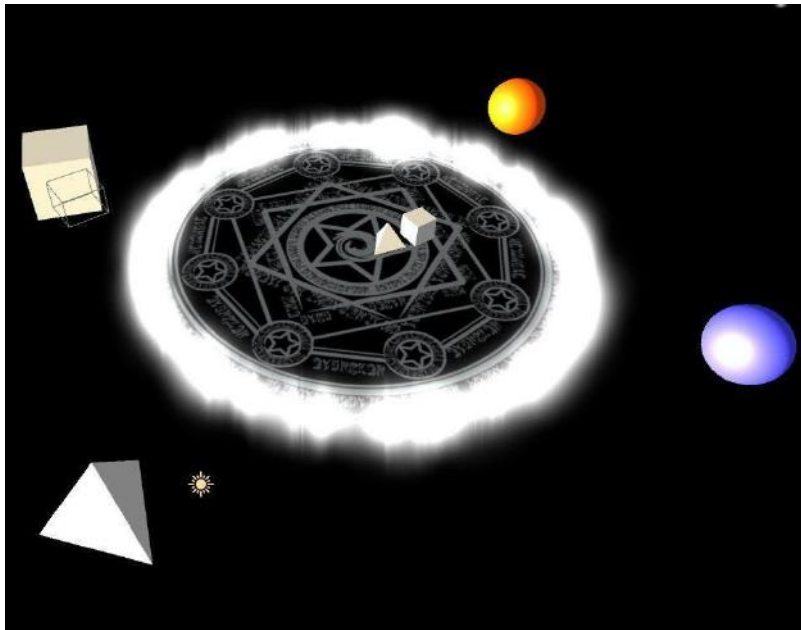
Now let's try to remove your fractal.

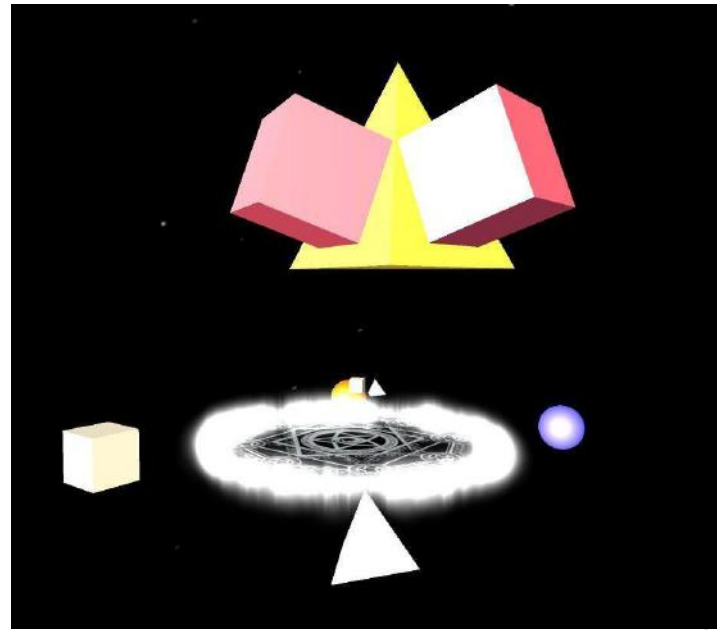- ▶ Press the joystick on either of your controllers. Then the fractal you just created will be removed.

Walkthrough – Step5

Now let's do a little more exploring to better understand what these shapes are doing.

▸ Try to add a cube to the magic circle the same way you added the pyramid. Then create another fractal (cast your spell again).

Pyramid and cube in magic circle

New fractal

Walkthrough – Step6

Now let's try to clear a defined function (sphere or magic circle).

▸ Move your left hand close to the section you want to clear until you see a red circle, then press your left index finger.

Walkthrough – Step7.1

Now let's explore what we can do with the spheres.

▸ Place a pyramid next to the blue sphere. Then grab a blue sphere and place it next to the original blue sphere. You should see a pyramid and sphere orbiting the larger sphere, as shown here.
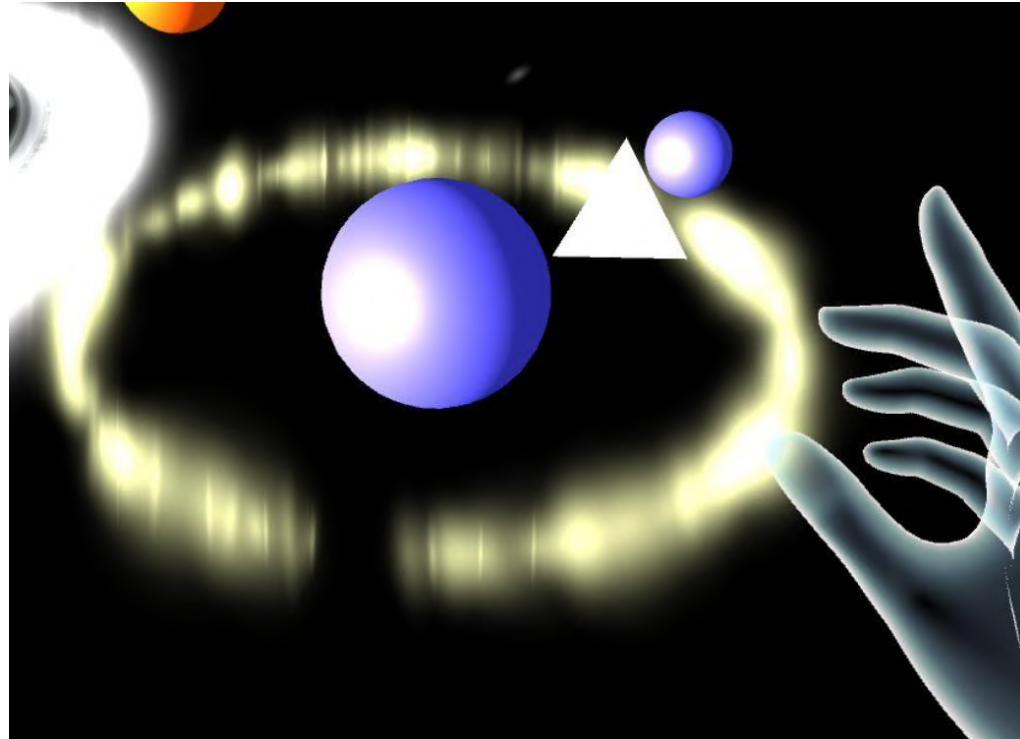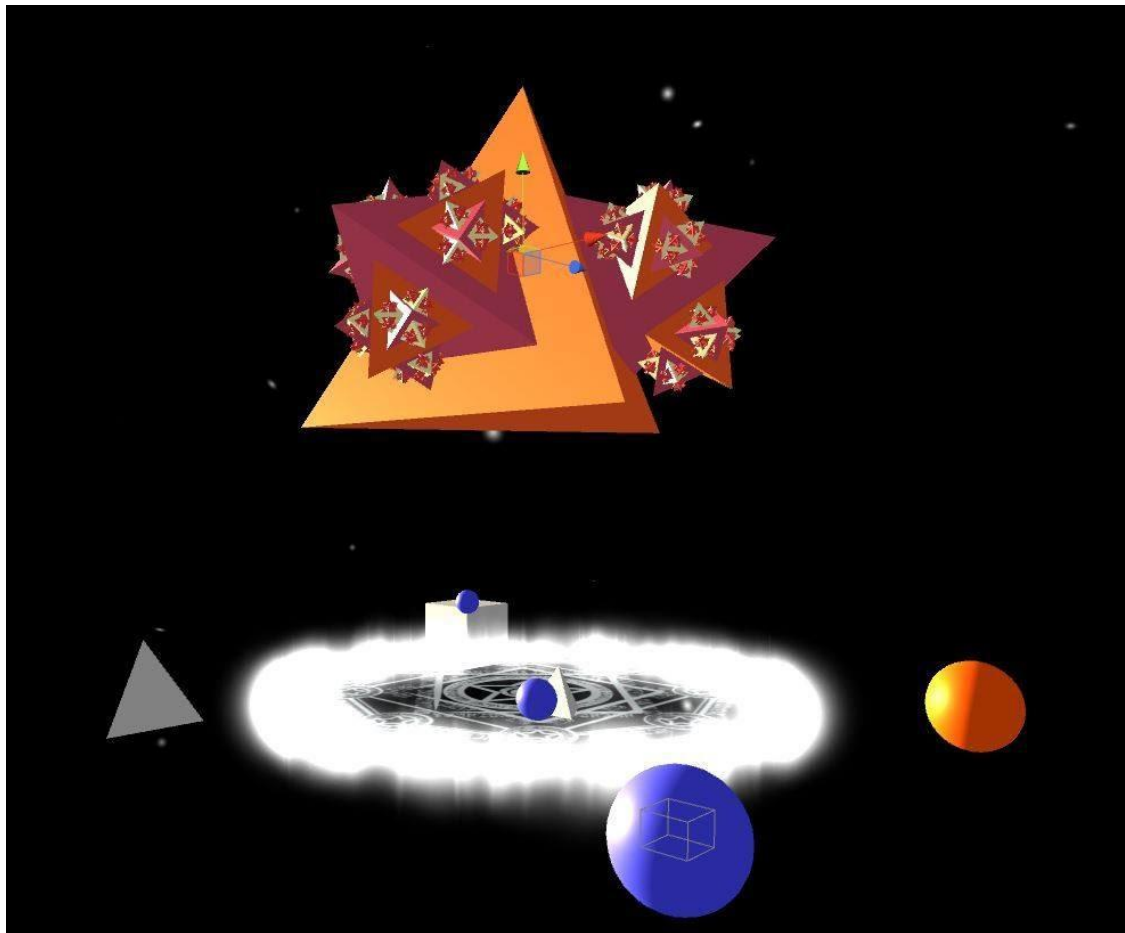
Walkthrough – Step7.2

▸ Clear the magic circle (see step 4), then add a blue sphere to the magic circle. The magic circle should look like this:

Walkthrough – Step7.3

▸ Now if you create a fractal (cast your spell, see step 3) from the magic circle. You should get a fractal construct with many layers of pyramids.


Note:
Theoretically there should be infinite layers of pyramids, but we limited the number of layers to 7 due to graphics card limitations (the prototype starts lagging after 7 layers).

Walkthrough – Step8.1

The orange sphere works the same way as the blue sphere. Let's do some more exploring.

▸ If you place a pyramid and then a cube next to the orange sphere, place an orange sphere and then a blue sphere next to blue sphere, and place only a blue sphere in the magic circle, then you could be able to create a fractal like the one shown below.
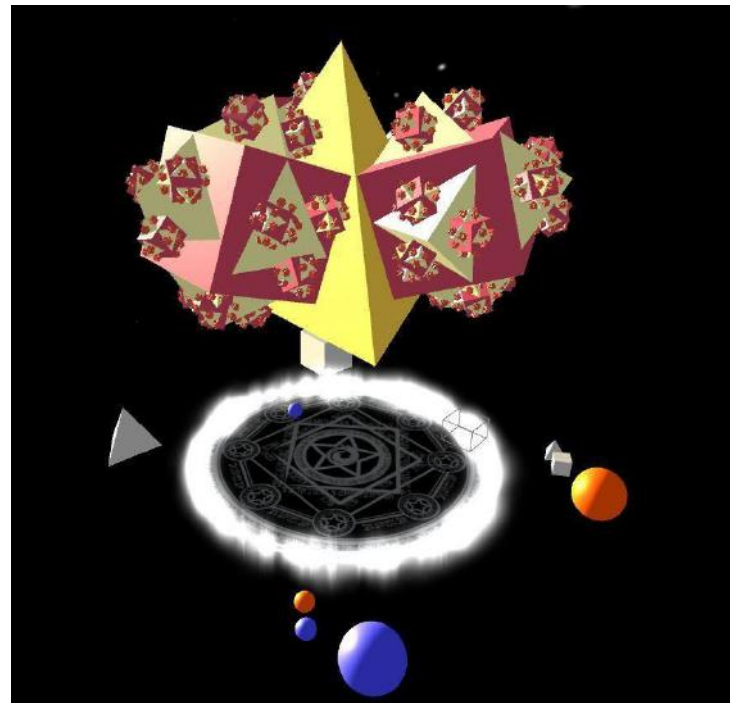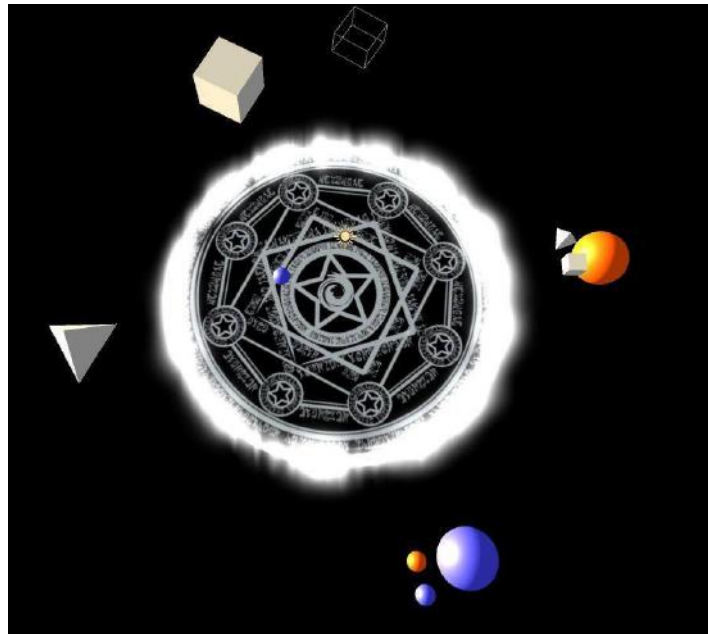
Walkthrough – Step8.2

▸ Similar to the one before, if we place a pyramid and then a cube next to the orange sphere, place a blue sphere and then a orange sphere next to the blue sphere, and place only a blue sphere in magic circle, then it will create nothing.

▸ This is because when you try to create a fractal, it will start from the magic circle and try to move to the blue sphere. The first step of the blue sphere is a blue sphere, so it will start over at the blue sphere again and this will continually repeat. So it will never arrive the orange sphere or create any shapes.

▸ That is why when you release the magic, you will create nothing.

Common Problems

- Q: Why nothing is created for fractal?
- A: Check example 8.2, make sure it is not an empty recursion.

- Q: Why does the fractal stop growing after several steps?
- A: Due to the limitation of the rendering ability of the GPU, the fractal is limited to 7 layers.