Monthly Progress Report
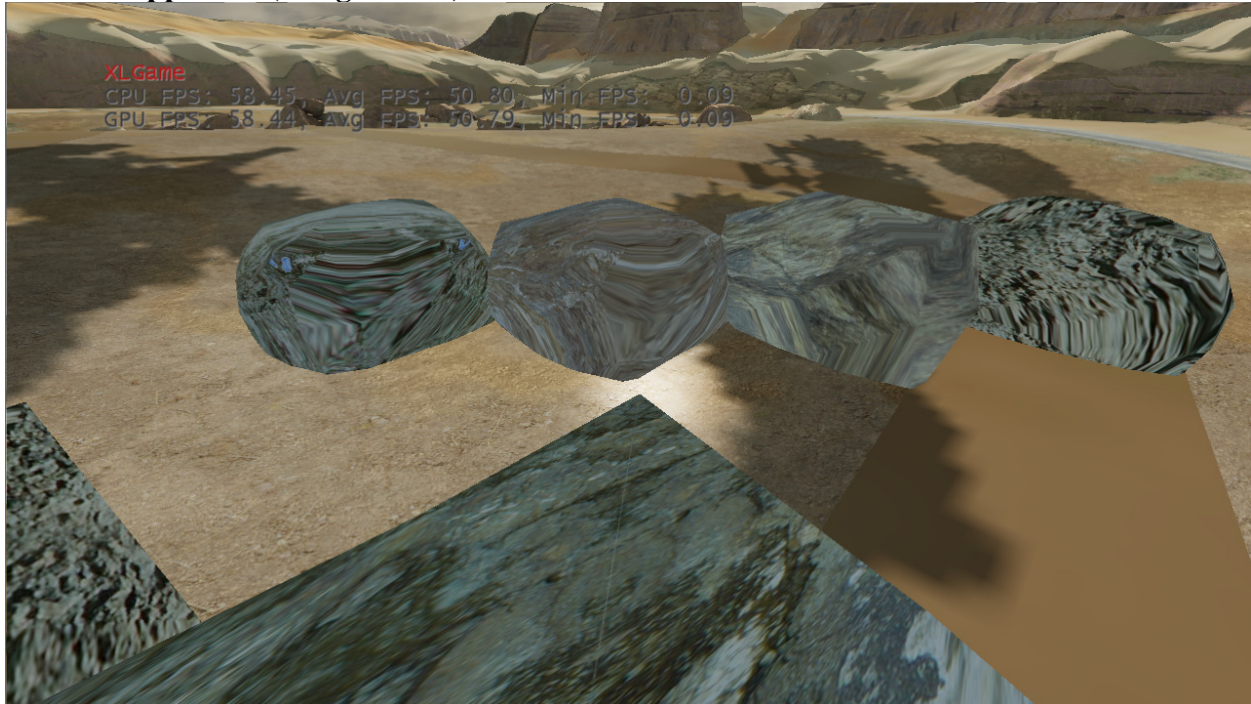
Project: Implementing real-time subdivision surfaces for game applications

The new approach (using shader)

This new shader approach can display texture and other effect in current game, however implementation is redundant and tedious. A better way to solve this is to do direct subdivision on 2XL surface.

Due to excess processing time required, the higher level subdivision is too slow (level is larger than two). The current subdivision method in NVidia demo is also just one level. The current subdivision time on a single object is around 1ms for level 1 subdivision, which has very little effect on the fps.

The new approach also make subdivision possible on open suface, the subdivision scheme on border is like the following:
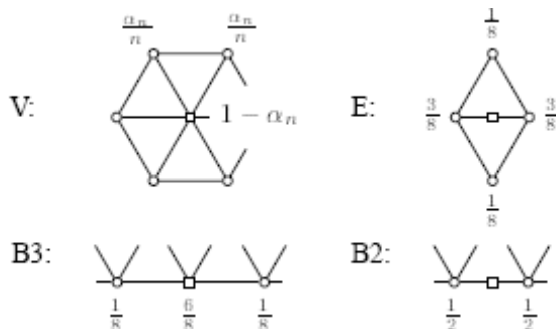
This will make subdivision on XLSurface easily since most default surfaces in our games are open surfaces (The previous implementation cannot work on them).
And a group file format is adopted to make more convenient editing. The format is as the following:

```
[Global]
numObjects = 8
;----------------------------------------------------
[Obj1]
name = 1
pos = 1300, -6000, 300
tex = felsen.jpg
;----------------------------------------------------
[Obj2]
name = 2
pos = 1340, -6040, 300
tex = CDCTexRuffRock02.dds
.
```

The format is similar to SET file in Baja game.

Failed approach (Subdivision based on Bezier patch)
The approach is failed because lacking of fundamental mathematics knowledge. This scheme is raised during the middle of December. The steps are:
1. Create object models using 3dmax and save to Bezier control points
2. Load Bezier control points into game
3. Do Subdivision on Bezier patch
   ▪ Interpolate Bezier control points
   ▪ Generate triangle list using newly generated control points
   ▪ Generate vertex/index buffer using triangle list

Next step
I will focus on the direct subdivision on XLSurface, the current one is based on wavefront obj format.
The detailed approach is as the following:

1. Read GEO/SET file
2. Create XLSubdivisionSurface
3. Do Subdivision on XLSubdivisionSurface
   • Subdivide based on LOD and subdivision scheme
   • Generate new triangle list
   • Convert triangle list into triangle strips
   • Convert triangle strips into vertex/index buffers

The XLSubvidivisionSurface is a subclass of XLSurface, which will maintain data structures and vertex buffers. This will free the subdivision module from rendering on its own; hence the subdivision module will only maintain the geometry of objects.