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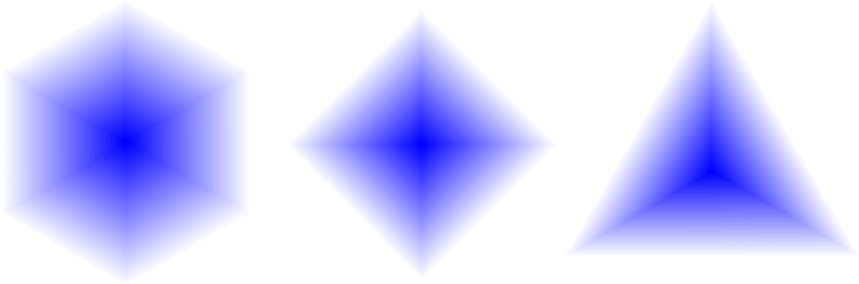
CS6610 Project Proposal

I would like to create a realtime NBody simulator. This simulator would make use of a compute shader for update steps, and a geometry shader to do something like a billboard particle. The billboard particle would likely not be a quad though. I would like to have the billboards have a vertex in the center that I can give the velocity color too, and have the outside vertices be transparent.



I just mocked these up in inkscape and the triangle is so much worse than I thought. The square isn't too bad though, as it somewhat mimics the 4-vane spider effect the Hubble telescope has. I think it would also be fun to have a background starfield cubemap.

I've made NBody simulators before like this one on Khan academy https://www.khanacademy.org/computer-programming/cs1410-animation/6326943488540672. That said I likely wouldn't have the black holes in this version. I would also like to make it 3d, as I've never done that, and have the camera move around. If I did that I would likely do away with the tail effect as I did that by rendering a semi transparent clear color between frames.

I've also made one that ran the Barnes-Hut algorithm, but I have no idea how I would give a quad tree to the gpu, and if I generate it in the compute shader, from what I understand, each particle would have to regenerate the quad tree. Any guidance on how I might achieve that would be appreciated. I will likely start with the n^2 algorithm so I can demonstrate my ability to make a compute and geometry shader, and when I get that finished I'll try to generate quad/oct trees to make it that much more impressive.