

CS564 Project Proposal

Implementation of Parallel Delaunay Triangulation

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A Delaunay triangulation of point set P is a triangulation such that the circle defined by each triangle contains no points from P in its interior. The Delaunay Triangulation can be reduced to a 3d-convex hull, using the lifting transformation, which vertically maps a point $p=(x,y)$ to the point $p' = (x, y, \|p\|^2)$, which lies on the paraboloid $z = x^2 + y^2$. The edges of the Delaunay triangulation of P are then a vertical projection of the convex hull edges of P' .

The program will generate a set of random points in two dimensions using various distributions (Gaussian, uniform, etc.) as input and calculate and visualize the generated Delaunay Triangulation as graphical output. The program will have a good user interface to specify the parameters, such as the number of points and distribution parameters. The program will support zooming in/out and moving the view while displaying the generated Delaunay triangulation.

I Will do an experimental analysis to measure the computational cost for various distributions and the speed-up of the parallel implementation.

I'll be implementing it on C with OpenMP. I'll complete the project solo.