**CMSC 180: Introduction to Parallel Computing**

**Second Semester 2022-2023**

**Laboratory Exercise 01 Part 1**

**Interpolating the elevations into a higher resolution digital elevation matrix M given a lower resolution digital elevation matrix N**

**Research Activity:** Write a computer program using the programming language of your choice to interpolate the unknown elevation of all the grid points of a matrix M. Just randomize the elevation of grid points that are divisible by 10.

**Exercise Specifications**

Write the main program lab01 that includes the following:

1. Read *n* as a user input (maybe from a command line or as a data stream)
2. Create a zero square matrix **M.** Assigned a randomized non-zero value (1-1000) to grid points divisible by 10 such (0,0), (0,10), (10,0), (20,0),(10,10) …… You can use a function for this but the running time of this will not be considered in the
3. Take note of the system ;
4. Call your function ;
5. Take note of the system time ;
6. Obtain the elapsed ;
7. Output the
8. (*Optional*) You can output the resulting matrix.

For example, for computing the matrix of a 100x100 square matrix M:

$ lab01 < 100

$ time elapsed: 10.2345 seconds

*Note: used float data type to get the exact interpolated value.*

Submit your code through the Google Classroom Laboratory Exercise 01 Part 1 portal.

**References**

Kidner, D., Dorey, M., & Smith, D. (1999). What's the point? Interpolation and extrapolation with a regular grid DEM. In *Proceedings of the 4th International Conference on Geocomputation: Mary Washington College : Fredericksburg, Virginia : 25-28 July, 1999* (-). GeoComputation CD-ROM. http://www.geocomputation.org/1999/082/gc\_082.htm

*Terrain Elevation Interpolation*. (1999). SoftWright. Retrieved January 19, 2023, from https://www.softwright.com/faq/support/Terrain%20Elevation%20Interpolation.html