Parallelized Traffic Simulation in C++

Zach Alaniz
Department of Computer Science
College of Science and Engineering
Texas Christian University
Fort Worth, Texas 76129
Email: z.a.alaniz@tcu.edu

Saby Sahoo
Department of Computer Science
College of Science and Engineering
Texas Christian University
Fort Worth, Texas 76129
Email: s.sahoo@tcu.edu

Bradley Schoeneweis
Department of Computer Science
College of Science and Engineering
Texas Christian University
Fort Worth, Texas 76129
Email: b.schoeneweis@tcu.edu

***Abstract*—This semester research project investigates the potential speedups and scalability of running a traffic simulation in parallel using C++ and OpenMP. These speedups are evaluated by comparing the sequential performance to the parallel performance when varying thread counts for a fixed-size, randomized input. While a large percentage of the program is inherently sequential due to computation, the process of transitioning from one state to another was parallelized.**

***Index Terms*—OpenMP, Cellular Automata, Parallel Simulation, C++**

I. Introduction

II. Background and Related Research

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

[2]

III. Parallelization Technique

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

[3]

IV. Summary of Results

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetuer adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

V. Conclusions, Lessons Learned, and Future Work

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetuer.

References

[1] T. A. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, *Introduction to Algorithms*. MIT Press, 3rd ed., 2009.
[2] M. J. Lazlo, *Computational Geometry and Computer Graphics in C++*. Prentice Hall, 1996.
[3] J. O'Rourke, *Computational Geometry in C*. Cambridge University Press, 2nd ed., 2005.