

Hourglass Cellular Automaton

Description

This Automaton uses a margolus neighborhood to calculate falling sand in an hourglass. It uses bit shifting and a lookup table to determine the next state of a kernel. The kernel consists of 2x2 cells. Cellular Automata are very good for parallelization, so this application can run either single threaded on the cpu or multi threaded using OpenMp or OpenCL.

The following table list all inputs:

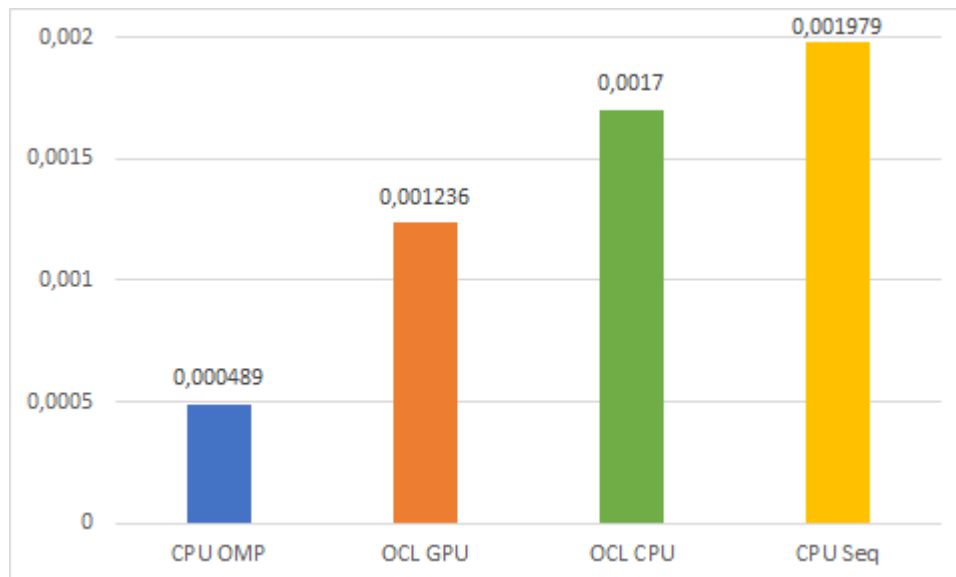
Input	Function
R Key	Reset Scaling
Plus (+) Key	Enlarge Selection Radius
Minus (-) Key	Decrease Selection Radius
Left Click	Remove Cells
Right Click	Add Sand
Middle Click	Add Wall
Left	Rotate Left
Right	Rotate Right
Up	Zoom in
Down	Zoom out

Command line parameters are:

Parameter	Options
--mode	seq - uses cpu single threaded omp - uses omp parallelization ocl - uses openCL
--device	cpu - only uses cpu gpu - only uses gpu
--measure	If this parameter is set, the time needed to compute the next state is printed in the console

Performance Measurements

The following diagram shows the time needed to compute the next state measured on my setup. (Intel i7-7700HQ, Nvidia 1050 Ti) The time is measured in seconds.



Memory usage sits at about 250 MB for OpenCL. OMP and Sequential execution need only about 109 MB of memory.