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Parallel Computing in Cellular Automata

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Overview

Automata is a useful tool for abstraction in real-life problems. In automata systems, every future state of a cell is determined by the previous state of the cell itself, states of adjacent cells and some random numbers.

Automata problems are easy and efficient to be implemented with the help of parallel programming. Those needed adjacent states data could be transferred among adjacent computing nodes for efficient communication. After communication every processor could compute the new states of the cells inside the processors.

Problem Descriptions

(This is simplified problem description of problem 6-21 in the textbook.) Inside an island there lives three types of creatures: rabbits, foxes and vegetation. The vegetation grows on the regular basis. The rabbits survive on the vegetation, but too many rabbits may cause starvation and increasing chances of being hunted by foxes. Foxes eat rabbits however too many of them may

also cause starvation. Fox can migrate faster than rabbits. Actions including preying, growing, migrating etc. are affected by random generated numbers.

Goals

1. **Implement the cellular automata problem in c++ or java**

2. **Test the functionality, performance under different configurations.**

3. **Investigate the speedup.**

Milestones

1. Project proposal submission (deadline 24/3)
2. Intermediate discussion (19~21/4)
3. Deadline of report (5/5)
4. Oral presentation (19~21/5)