

A parallelized and distributed approach to implementing Conway's Game of Life

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Abstract

In this report, we will explain our two solutions for implementing Conway's Game of Life in go. The first solution is designed to be run on a single machine, and makes use of all the cpu threads available on a computer through the parallelization of the program. The second solution is designed to run on multiple machines, allowing for the work to be distributed across multiple machines. This second solution uses aspects of the first solution within each worker.

I. INTRODUCTION TO THE PARALLELIZED SOLUTION

- single threaded implementation
- events passing (alive cells, turn completed)
- PGM image output implementation
- SDL implementation (flipped cells events)
- using channels and goroutines to create multiple workers (parallelizing the solution)
- switching to a memory sharing solution instead of using channels (TODO?)
- implementing halo exchange

II. BENCHMARKING METHODOLOGY

- use built in go benchmark framework
- run command
- output to txt
- run python script to plot graphs
- bar chart of time taken against threads used

- runs benchmarks on all pgm images
- repeats benchmarks until results fall within a certain standard deviation (TBC)

III. PARALLELIZING THE PROGRAM

- show workers pseudocode
- show handler pseudocode
- flowchart/ diagram of how channel communication workers
- simple flowchart of how the whole program works currently

IV. PARALLELIZING BENCHMARK AND CRITICAL ANALYSIS

- show graph for 5120x5120.gpm for single implementation vs parallel implementation
- describe the differences between each graph
- explain the differences by referencing the flowchart/ how the code works
- explain the shape of the graph (why it resembles a 1/x graph). e.g. bottlenecks

*A thank you or further information

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in channel communication...

V. MEMORY SHARING

THIS SECTION WILL BE USED IF WE DECIDE TO IMPLEMENT MEMORY SHARING OVER CHANNEL COMMUNICATION

VI. BENCHMARKING AND CRITICAL ANALYSIS OF THE MEMORY SHARING

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VII. IMPLEMENTING HALO EXCHANGE TO BE IMPLEMENTED

VIII. BENCHMARKING AND CRITICAL ANALYSIS OF THE HALO EXCHANGE

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IX. BENCHMARKING AND CRITICAL ANALYSIS OF ENABLING SDL

- show graphs and describe shape and differences of with vs without SDL

- explain how SDL works
- explain how this causes bottlenecks

X. COMPARING THE PARRALEL BENCHMARKS

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Text requiring further explanation¹.

XI. RESULTS

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¹Example footnote

Table 1: *Example table*

Name		
First name	Last Name	Grade
John	Doe	7.5
Richard	Miles	2

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XII. DISCUSSION

i. Areas for improvement

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ii. Thanks

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