

CS257 Report: Optimising the simulation of N -bodies behaving under the influence of gravity in a bounded cubical area

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1 Introduction

The aim of the coursework was to optimise a simulation of N -stars behaving under the influence of gravity in a cubical

The original code of the simulation revealed a four loop structure (named loop 0 – 3), with each successive loop depending on the previous loop. Loop 0 cleared the acceleration array, loop 1 then populated the acceleration array based on positions of the stars. Following that, loop 2 updates the velocity array and finally the last loop calculates the new position of the stars and, if a star reaches the edge of the cubical simulation area, it is “bounce back” into the area by inverting the appropriate components of its velocity.

2 Structural Optimisations

3 Threading

4 Comparison of Different Versions