Names:

Isaac Plunkett

Briana Liosatos

422 Project 1 Report

MAKE TO PDF

Introduction

The problem that is going to be solved is the NBody problem. Bodies are placed in a space and given their own x and y velocities. Each body exerts a force (gravity) on the other bodies in the space. When one body gets close to another body, the forces between the two causes the bodies to rapidly approach each other, resulting in a collision. When a collision happens, the two bodies change the direction of their velocity vectors and move away from one another at a faster speed.

Programs

There are two versions of the NBody problem. A sequential and a parallel version using threads. Both were written in Java using the Eclipse software.

Each version takes the same command line arguments. The first argument is how many workers or threads are to be used. For the sequential this is set to 0, and 1 for the parallel. The second argument is the number of bodies that are to be used for the simulation. For both versions, number of bodies is set to 2. The third parameter is the size of the bodies (their diameter), which is set to 7 for both versions. The fourth parameter is the number of timesteps, set to 1000. Timesteps is how many times the loop for changing the position and velocity of the bodies is called. The fifth parameter is if the GUI should be displayed, the default is set to true. The last parameter is to set the size of the bodies to random sizes. This is set to false to start and the bodies have a size restraint of being a minimum of 10 and a maximum of 50.

In the parallel version, the barrier that is used is a dissemination barrier. A 2-D array of semaphores is created to stop threads at the correct stage of the program.

ANY OPTIMIZATIONS

Verification

We used print statements and the GUI to help determine if the program was working correctly. JUnit tests were also written to test for the movement of the bodies for one timestep (pass of the loop that performs the physics on the bodies) and the collision between two bodies.

Timing Experiments

We used the NAME OF THE LAB COMPUTER to do our timing experiments.

TODO

. Present the results from the timing experiments. Use tables to present

the raw data and graphs to show speedups and comparisons. Also

explain your results

. Do not just present the output data. What do the results show? Why?

•

For one of our extra experiments, a GUI was created. The time was taken for the same program requirements for when the GUI was created and when the GUI option was turned off.

Other Experiments

. Describe the questions that you set out to answer, the experiments you

conducted, the results you got, and your analysis of the results. Present the results in

whatever form seems most compelling to you. Your analysis should explain why you think

you got the results you did.

•

Conclusion

. Briefly summarize what your report has shown. Also, describe what you have

learned from this project