The simulation before optimisation runs in time O(n^2), since there are n^2 comparisons on each iteration. This is a relatively poor performance, as displayed by the table below; a relatively small increase in the number of bodies caused a significant increase in the runtime.[RUN ON HAMILTON]

For close particles, the performance increases over time due to the merging of the particles (which effectively reduces the size of n). This can be seen displayed in the graph below:[RUN ON HAMILTON]

Initial conditions:

1. Spherical
2. Sphere with initial outward velocity
3. Disc