CS 5220 – Sep. 15 Preclass Questions

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Question 0

I started this at 12:30 AM and finished at 1:30AM. It took me 1 hour.

Question 1

I'm not too familiar with ODEs and PDEs, so those sections did not make much sense to me, especially in relation to particle systems. I was also not sure what was going on with the particle on the mesh and how that helps us with the far-field forces.

Question 2

A totient node has 15MB in the L3 cache.
http://www.newegg.com/Product/Product.aspx?Item=N82E16819117480.

Each cell is represented with 1 byte. We keep two copies of the board around. Therefore, we can have two 7.5MB boards. So we can fit 7.5MB cells in each board. So we take the square root of 7.5 and we get a 2738 by 2738 grid of cells if each cell requires 1 byte. If we look at the seconds to per cell, they are about the same for both something that fits in L3 and a size of board that does not fit in L3, which means we are compute bound.

Question 3

We can query the cache size and then we can create blocks based on the cache size, and then align them in memory so that the compiler can start prefetching so we can increase operational intensity.

If we want to perform several generations, then we can just load one block into memory and then just perform several generations on that one block.

Question 4

To parallelize the game of life, we first need to find the set of nodes and their neighborhood of possible next positions. We can then parallelize over these sets of nodes.

Question 5

If two particle influences one another, then it might be difficult to share memory between processors to apply the forces between particles. We then loop over all possible combinations of particles. Also, if forces are symmetrical, then we could improve by applying the two forces between two particles simultaneously.