Report - HW5

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In a brief report describe how your parallelization works and list/describe any optimizations that you did. If you added new source files, list them and briefly explain their purpose.

We started by parallelizing the game_of_life function. In our parallelization we split the main board into 4 sections where each section has (number of rows) / (number of threads) count of rows. Since there is no overlap in the work that threads are doing, no synchronization primitives are required and no interprocess communication will be required. Due to this we get a big speed up.

The next optimization we did was trying to remove as many conditional statements from inside the for loop bodies since this introduces pipeline bubbles. We realized that the mod function is only required for the edge cases. Therefore, we split our calculations into 4 chunks. The first calculates for the first row, the second calculates for the last row, the third calculates for the first and last column and finally the last calculates the inner board without the boundary.

Other optimizations we did were removing as many loop invariants as we could, along with changing the BOARD macro so that it traverses the board in the direction that helps caching.

We also tried to do loop unrolling, but we saw that this was not helping our performance as there might be functional unit dependencies.