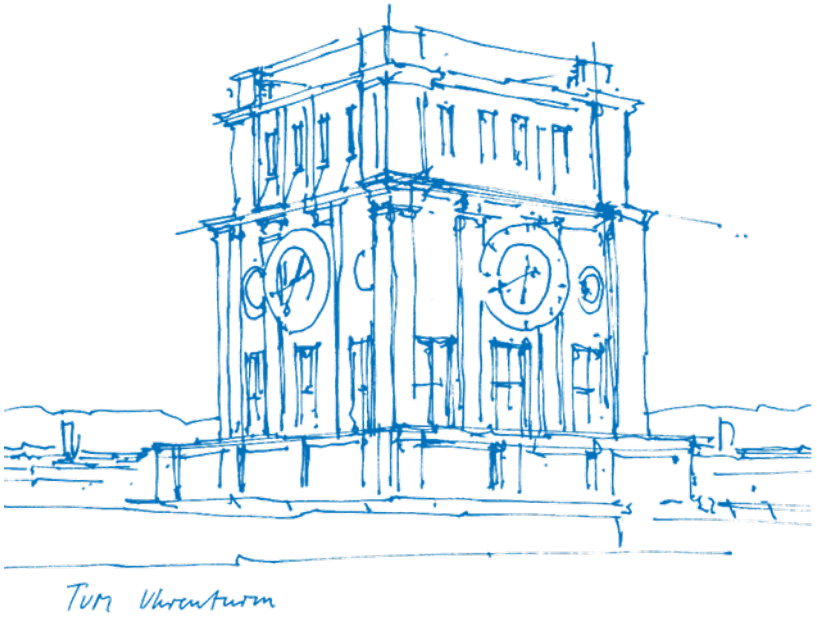
Parallel Programming Homework Bonus Assignment

Chair for Computer Architecture and Parallel Systems (CAPS)
Technical University Munich
June 2, 2021



Bonus Assignment: The Game of Life

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- Played on a regular 2D grid of cells.
- Kind of like a stencil code.
- Each cell is updated according to four rules per iteration (from Wikipedia):
  - Any live cell with fewer than two live neighbours dies, as if by under-population.
  - Any live cell with two or three live neighbours lives on to the next generation.
  - Any live cell with more than three live neighbours dies, as if by overpopulation.
  - Any dead cell with exactly three live neighbours becomes a live cell, as if by reproduction.

Figure 1: Animation of the Game of Life (by Lucas Vieira)

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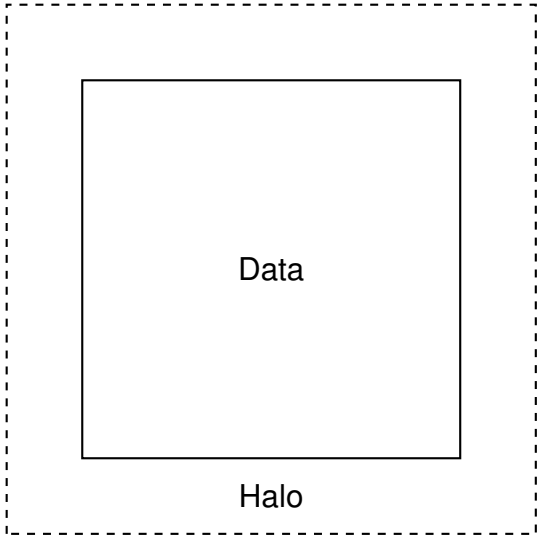
- We are simulating the game of life on a torus.
- On a 2D grid, this means that whenever we overrun the bounds in one direction we wrap around to the other end of the grid.



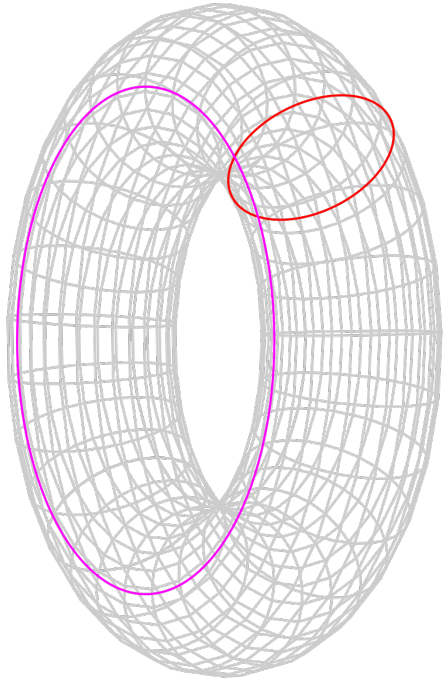


Figure 2: A Torus (from Wikipedia)

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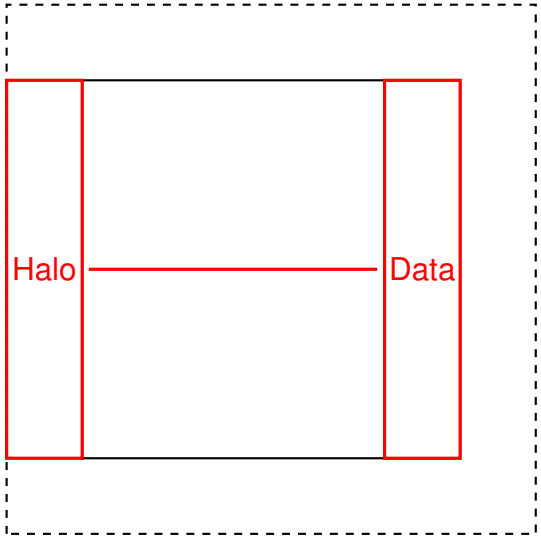

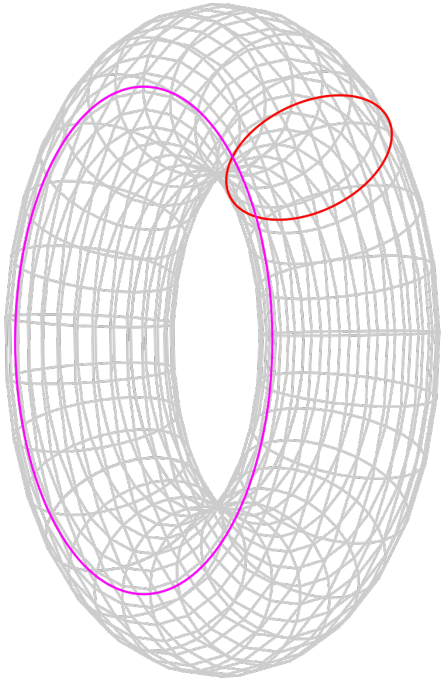

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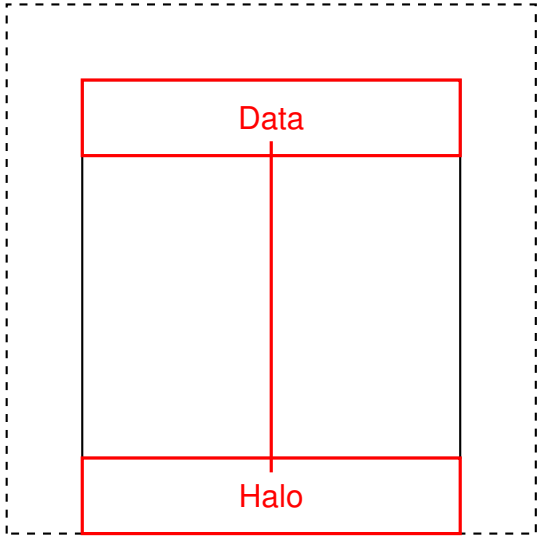

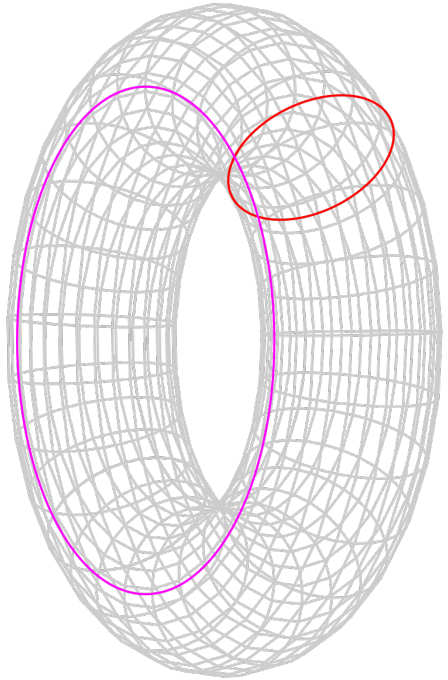

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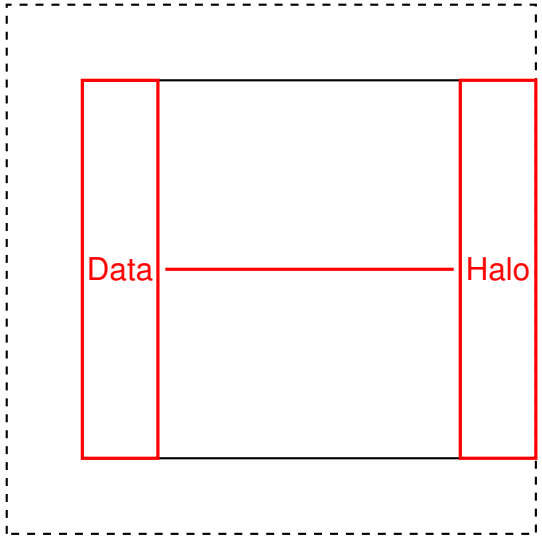

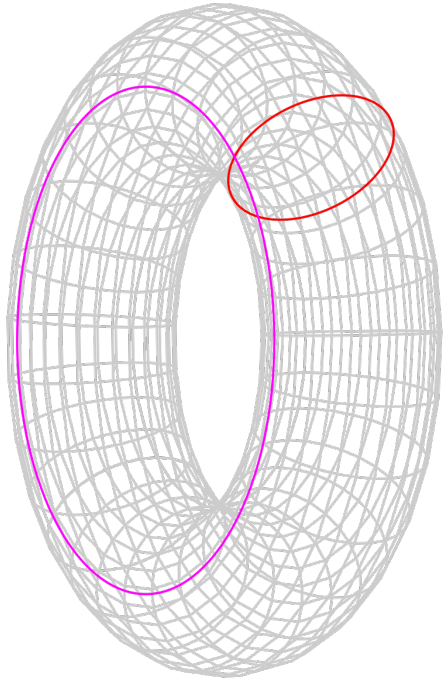

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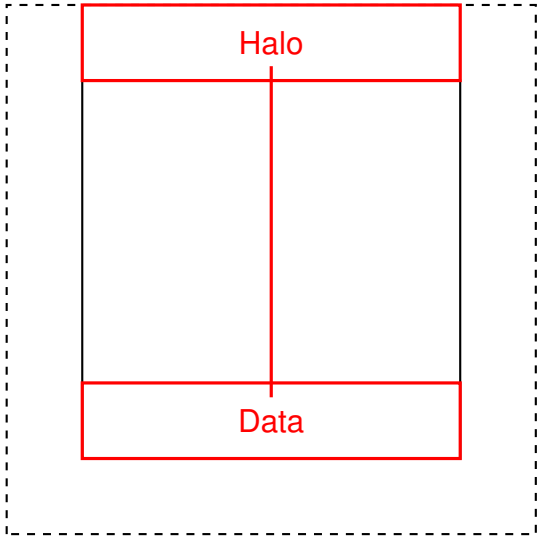

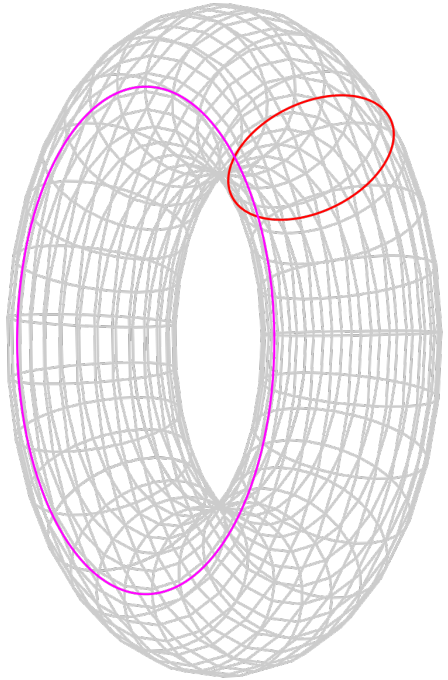

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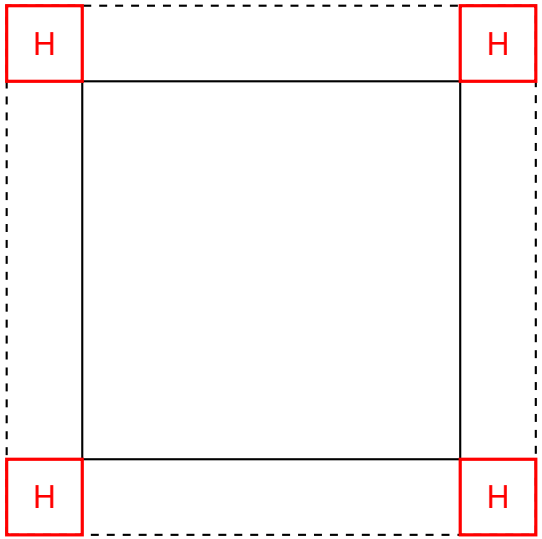

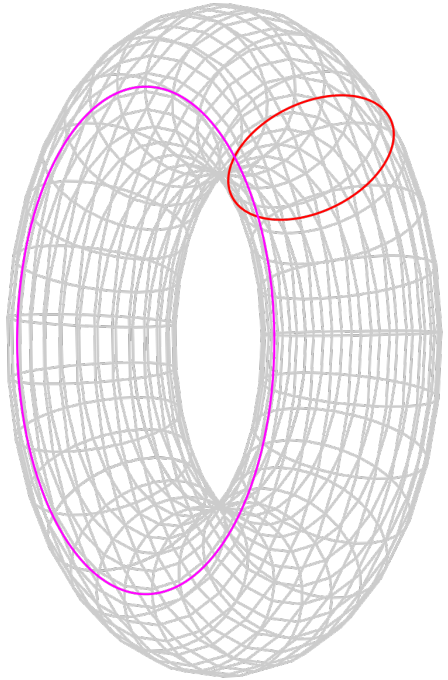

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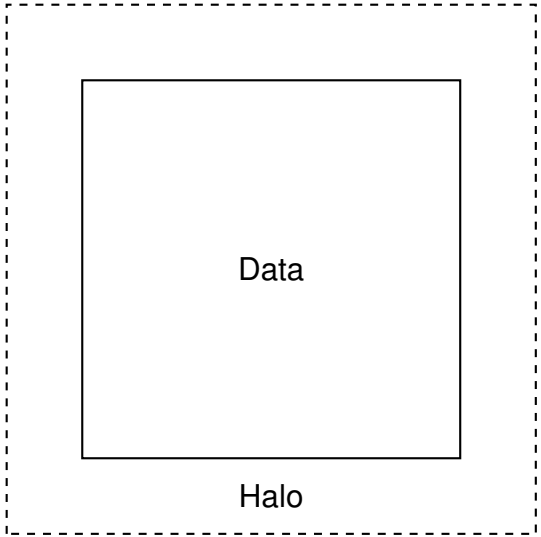

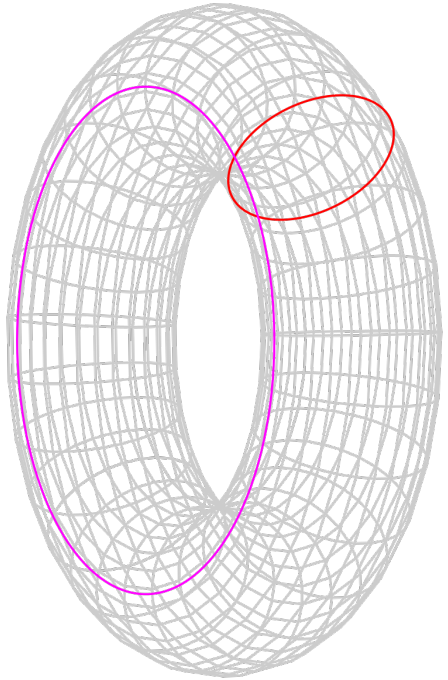

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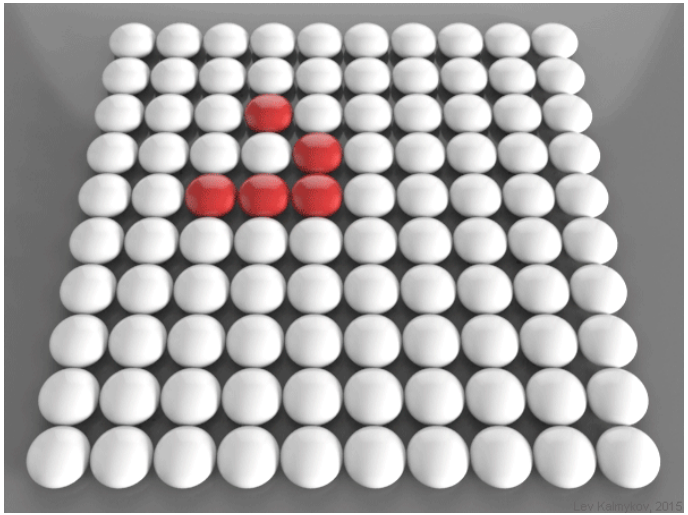

Figure 3: Game of Life on a torus (by Lev Kalmykov)

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Required Speedup is x13 using 16 ranks.
For more information,
refer to the assignment's README.