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# 

**Introduction:**

This is a program using pthreads to estimate the temperature of all points on a grid.

Parameters and specifications:

1. Grid size = 1000 x 1000, spanning all points in the square between coordinates (1,1) and (1000,1000).
2. Initial condition: All center points in the region (200, 200) to (800, 800) have a temperature of 500 degrees, and all other points have a temperature of zero. Points outside the grid (i.e., neighbors of points on the boundary) always have a temperature of zero that does not change.
3. At each time step t, the temperature of a point at coordinates (x,y) is computed from the temperatures of the neighboring points in the previous time step (t-1) according to the following equation:

T(x,y)(t) = T(x,y)(t-1)

+ Cx \* (T(x+1,y)(t-1) + T(x-1,y)(t-1) – 2 T(x,y)(t-1))

+ Cy \* (T(x,y+1) (t-1) + T(x,y-1) (t-1) – 2 T(x,y) (t-1))

Where Cx=0.125 and Cy=0.11

1. Run the program for 4000 time steps. Note that depending on how you split your data, you may need to communicate information to neighboring processors after each time step.
2. After each 200 time steps, you should print the temperatures of the following points: (1, 1), (150,150), (400, 400), (500, 500), (750, 750), and (900,900).

4000/200 = 20 lines. => Temperature of 6 points

A diagram of temperature

Description automatically generated

To compile the code, we use:

cc -lpthread -lrt HW3\_updated.c -o HW3\_updated1

On macos, the -lrt flag is not needed.

To run the code executable, we can use:

./HW3\_updated1 16

To run 16 threads for example