Assignment 2 Report

Initial average runtime: 87.4 seconds

1) Change: Swap order of x and y looping
Reason: Minimise number of passes through data
Average run time: **81.2 seconds** (medium effect)

2) Change: Added "double a = 1.0/pow(dx,2.0) \ double b = 1.0/pow(dy,2.0)" outside of loops
Reasons: -Avoiding unnecessary repeated computation
-Replace expensive arithmetic with multiplications
Average run time: **28.3 seconds** (major effect)

3) Change: Factorised a and b out of expressions
Reason: Reduce number of floating point operations
Average run time: **26.3 seconds** (medium effect)

4) Change: Added "double c = dt*alpha/k \ double d = dt*D" outside of loops
Reasons: -Avoiding unnecessary repeated computation
-Replace expensive arithmetic with multiplications
Average run time: **25.3 seconds** (medium effect)

5) Change: Defined then added "u_bottom = u[ix][0] \ u_top = u[ix][Ny-1]"outside of iy loop
Reason: Optimising memory access patterns for efficient use of cache
Average run time: **25.2 seconds** (minor effect)

6) Change: Create u_dummy to allow swapping of u and u_new pointers without element by element assignment
Reason: Minimising number of passes through data
Average run time: **24.5 seconds** (medium effect)

7) Change: Compile fishkol.c with -O3 flag
Reason: Better performance
Average run time: **3.5 seconds** (major effect)

8) Change: Compile fishkol.c with -Ofast flag
Reason: Better performance
Average run time: **3.3 seconds** (minor effect)

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