**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)