# Tutorial - 5

In this tutorial, you will write a serial and an OpenMP programs for the solution of Jacobi iteration method that we discussed in the lecture.

1. Consider the solution of system of linear equations, $Ax = b$, where $A$ is the coefficient matrix, $x$ is the unknown vector to be determined and $b$ is a known right-hand-side (RHS) vector. The matrix $A$ is tri-diagonal and the coefficients on the sub, main, and super diagonals can be considered to be constant and equal to $(-1, 2, -1)$. As the matrix is banded, it is thought to not allocate or create the matrix A rather only work with the corresponding coefficients in the equations.

2. Develop a sequential program (in C/C++ or FORTRAN) for solving the system of linear equations described above using Jacobi iteration method. Assume a suitable RHS vector, $b$, that can be filled easily.

3. Develop an OpenMP version of the serial program that you developed earlier by suitably modifying the code. Convince yourself that the serial and the parallel programs that you developed are indeed giving correct result when the same $b$ vector is used. Using the size of the system as $n = 10, 100, 1000$ and 10000 and the number of threads as $p = 2, 4$ and 8 time your program. Do you notice any performance improvement using the parallel version of the program?