Here is the command and output of the matrix-vector multiplication program by using MPI.

Command: mpirun -n 1 ./18050111041 500 500 output.txt

Global Time: 0.000703

Speedup: 1.000000

Efficiency: 1.000000

Command: mpirun -n 1 ./18050111041 1000 1000 output.txt

Global Time: 0.005537

Speedup: 1.000000

Efficiency: 1.000000

Command: mpirun -n 2 ./18050111041 500 500 output.txt

Global Time: 0.000344

Speedup: 1.007201

Efficiency: 0.503601

Command: mpirun -n 2 ./18050111041 1000 1000 output.txt

Global Time: 0.004423

Speedup: 3.092595

Efficiency: 1.546297

Command: mpirun -n 3 ./18050111041 500 500 output.txt

Global Time: 0.000253

Speedup: 1.000000

Efficiency: 0.333333

Command: mpirun -n 3 ./18050111041 1000 1000 output.txt

Global Time: 0.002851

Speedup: 1.000000

Efficiency: 0.333333

Command: mpirun -n 4 ./18050111041 500 500 output.txt

Global Time: 0.002187

Speedup: 12.134689

Efficiency: 3.033672

Command: mpirun -n 4 ./18050111041 1000 1000 output.txt

Global Time: 0.002607

Speedup: 1.000000

Efficiency: 0.250000