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Homework-3 Report

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1 Introduction

This program was developed using the C programming language and MPI, a standard used in parallel computing applications. First, matrices and vectors were created based on the values received from the user. Then, the following commands were called and parallelized matrix vector multiplication was performed.

make
mpirun -n 2 ./hellomake 1003 103 output.txt

As a result of the above commands, the outputs are as shown below.

```
furkan@furkan-VirtualBox:~/Desktop/homework$ mpirun -n 1 ./hellomake 1003 103 output.txt
Elapsed time is 0.002745 seconds for parallel mxv with 1 processes
furkan@furkan-VirtualBox:~/Desktop/homework$ mpirun -n 2 ./hellomake 1003 103 output.txt
Elapsed time is 0.001185 seconds for parallel mxv with 2 processes
furkan@furkan-VirtualBox:~/Desktop/homework$ mpirun -n 3 ./hellomake 1003 103 output.txt
Elapsed time is 0.000788 seconds for parallel mxv with 3 processes
```

Figure 1: Large matrix with 1, 2, 3 process

```
furkan@furkan-VirtualBox:~/Desktop/homework$ mpirun -n 1 ./hellomake 1003 103 output.txt
Elapsed time is 0.000021 seconds for parallel mxv with 1 processes
furkan@furkan-VirtualBox:~/Desktop/homework$ mpirun -n 2 ./hellomake 1003 103 output.txt
Elapsed time is 0.000030 seconds for parallel mxv with 2 processes
furkan@furkan-VirtualBox:~/Desktop/homework$ mpirun -n 3 ./hellomake 1003 103 output.txt
Elapsed time is 0.000026 seconds for parallel mxv with 3 processes
```

Figure 2: Small matrix with 1, 2, 3 process

As seen in Figure 1 and Figure 2, while efficiency increases in the large matrix, there is not much change in the small matrix.
For Large Martix:

For 1 core	For 2 core	For 3 core	Productivity rate
0.002745	0.001185	0.000788	71.29 %

For Small Matrix:

For 1 core	For 2 core	For 3 core	Productivity rate
0.000021	0.000030	0.000026	-23.80 %