

Homework #4

cpe 512

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# Part 1

## Action 1.1

**Table 1: Laplace 2D OpenMP Run Times with NP = 1,2,4,8**



## Action 1.2

**Table 2: Laplace 2D OpenAcc Run Times Using Kernels**



The average run time has increased dramatically using only the “#pragma acc kernels” on the main loops.

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The commented lines “Action 1.2 Change” are the portions of code that were changed for this action item.

## Action 1.3

**Table 3: Laplace 2D OpenAcc Run Times Using Loop Improvement**



This is a significant improvement in execution time compared to the OpenMP version as well as just using the kernels directive in OpenAcc.

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The commented line “Action 1.3 Change” are the portions of code that were changed for this action item.

## Action 1.4

**Table 4: Laplace 2D OpenAcc Run Times Loop Tuning**



This is a very significant improvement over the OpenMP implementation even when using 8 CPU cores.

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## Action 1.5

**Table 5: Laplace 2D OpenAcc Run Times Parallel**



It seems that this is the slowest version yet, even slower than the OpenAcc kernels implementation.



## Action 1.6

**Table 6: Laplace 2D OpenAcc Run Times Parallel Transfer Reduced**





## Action 1.7

**Table 7: Laplace 2D OpenAcc Run Times Parallel Transfer Reduced Tuned**



Out of all the implementations thus far this is the lowest average execution time. With an average of 8.6 seconds over five runs compared to the 34 seconds over five runs for the OpenMP implementation utilizing 8 threads. The rest of the test cases with OpenMP do not even come close to the speed this solution offers. The GPU version seems to fair quite a bit better for this type of problem.



# Part 2

## Action 2.1

## Action 2.2

# Appendix

Add anything else that might be pertinent to the assignment.