

3 Task 3

For Task 3 the same settings were used as described for Task 2. The underlying data type of the discretization (as well as step size etc.) was changed from double to float and the program executed on the cluster. The resulting speedup and efficiency plot are shown in figure 3 and 4. In Figure 5 the two outputs from Task 2 and 3 are shown. They differ from the 6th decimal place.

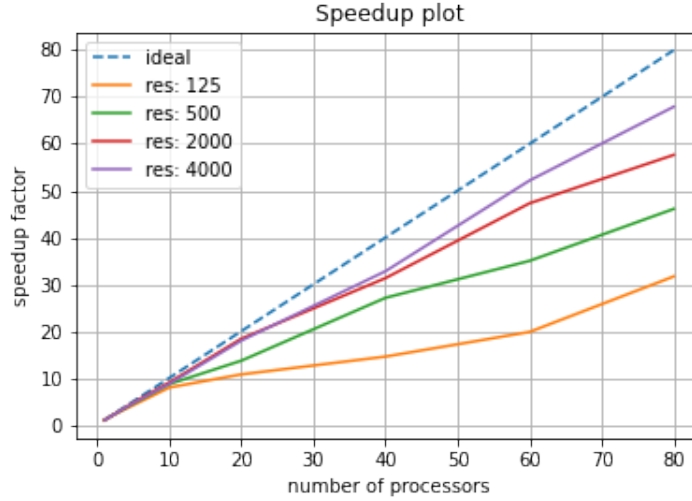


Figure 3: Speedup for different resolutions dependent on the number of processes.

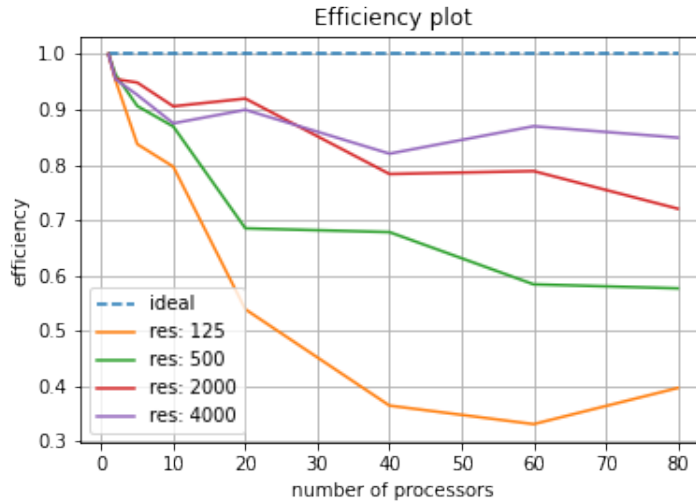


Figure 4: Efficiency for different resolutions dependent on the number of processes.

To directly compare the speedups of Task 2 and Task 3, they were plotted together in figure

No. of processors: 4 resolution: 125 iterations: 10 DIM: 1D	No. of processors: 4 resolution: 125 iterations: 10 DIM: 1D
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Total Runtime = 4.55845036e-02 seconds	Total Runtime = 1.23710150e-02 seconds
Average Runtime = 4.55845054e-03 seconds	Average Runtime = 1.23710150e-03 seconds
Residual Euclidean Norm = 1.47914914e-02	Residual Euclidean Norm = 1.47915005e-02
Residual Maximum Norm = 2.31379471e+01	Residual Maximum Norm = 2.31379821e+01
Totalerror Euclidean Norm = 2.67870694e-01	Totalerror Euclidean Norm = 2.67870744e-01
Totalerror Maximum Norm = 1.99439743e+02	Totalerror Maximum Norm = 1.99439774e+02
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Figure 5: Comparison between the output for Task 2 (right) and 3 (left).

6. No significant differences can be seen although it was expected that the implementation with float would be faster. The largest differences can be seen with 80 processes with the implementation in Task 2 experiencing higher speedup. It appears that the differences in memory do not contribute to a significant delay.

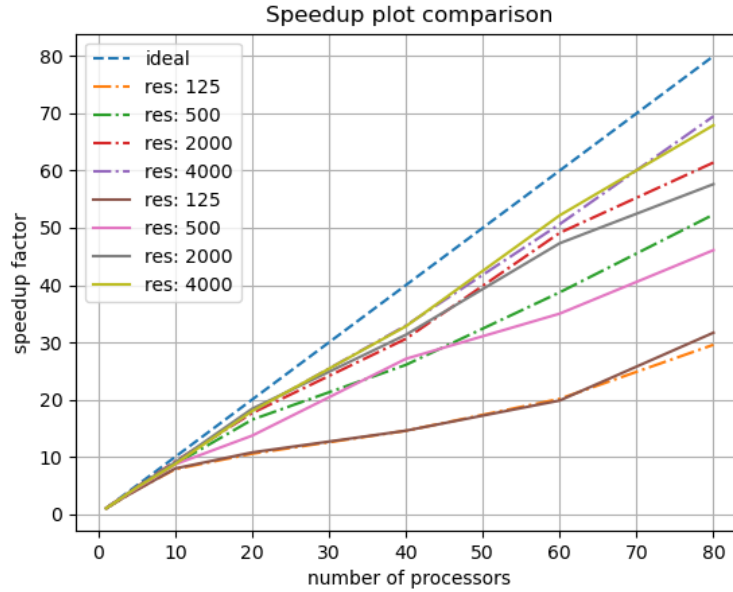


Figure 6: Comparison between the speedup for Task 2 (dash-dotted line) and 3 (full line).