CS633- Parallel Computing

Group No- 38

> Srinjoy Sarkar
> Tafazzul Nadeem
> Snehal Agarwal

Assignment-1 Report

Explanation of Code

The stencil code receives various arguments from the command line and stores it into the variables. Then every process initializes the data. Four variables as flags are used to know the topological position of the process i.e if any process is at the left of the current process, then the left flag is set and similarly for all other positions. According to the flag status of the process and the type of stencil passed, data is packed and sent to neighboring processes. Likewise the data from neighboring processes are received and unpacked using these flags. After completing the communication part, the computation of data, 5-point or 9-point averaging is done by first taking care of the corner points and then all other points. The communication and computation part is repeated for 'steps' times and the total 'Wtime' at every process incurred is then communicated by the 'Reduce' collective call to process '0' with 'MPI-MAX' which prints the max time.

Timing Plot

The box plots for max execution times of 5-point and 9-point stencils are plotted. Three Prutor execution data are used to plot the boxplots as shown below.
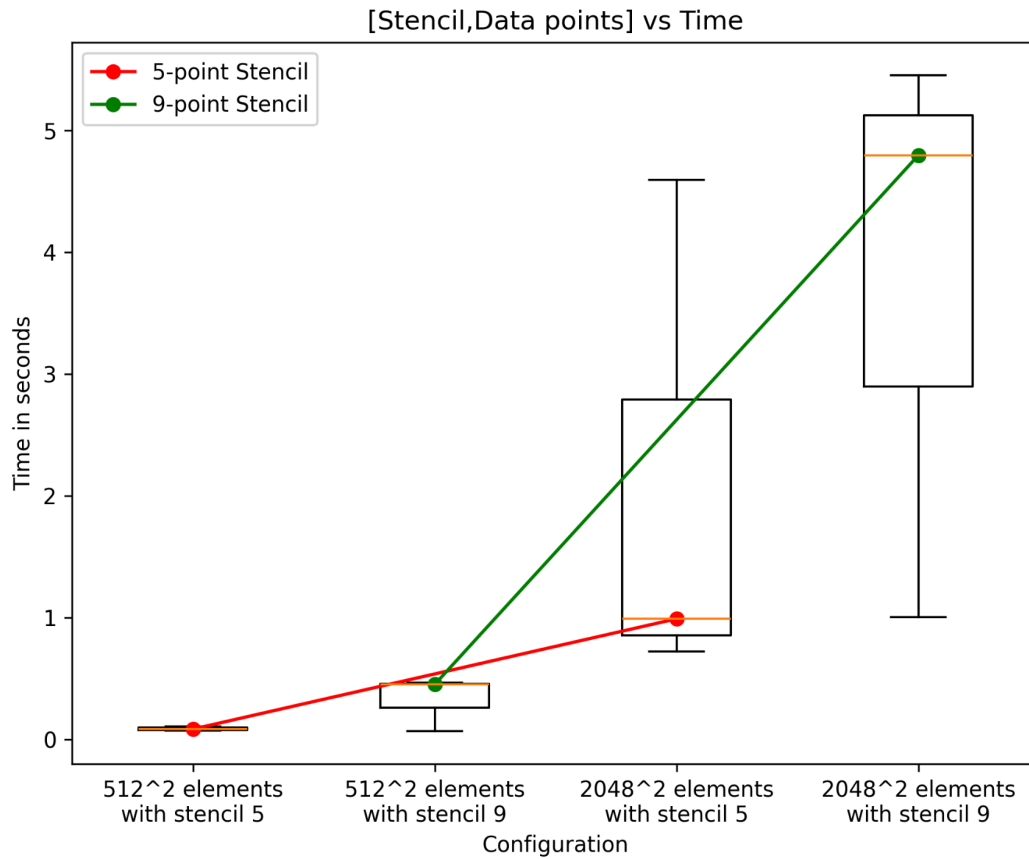
Fig.1- Boxplot of Execution time vs Configuration

Observations

The predominant observation from the plot is the difference in rate of rise of execution time from 512^2 to 2048^2 data points in case of 9-point stencil with respect to 5-point stencil configuration. This is due to the fact that the data size is increasing exponentially and hence the rate of increase in the amount of data to be transferred increases exponentially.