

Parallel programming

Report assignment





Your task

- Take a solution of either HW1 or HW2, run various problem-size instances with distinct numbers of threads, and measure the computational time
- Create an analytical report of the following structure:
 - Introduction
 - Scalability graph
 - Performance graph
 - Efficiency graph
 - Discussion and conclusion



Introduction

- Describe which of the homework assignments was investigated
- Mention how you applied technology in the program (OpenMP, MPI)
- Which fragment of the algorithm is parallelized?
- What's the bottleneck in the program?



Experiments execution

- The execution must be performed on **Metacentrum**
- Compare the sequential version with the parallel version executed on 2, 4, 8, 16, 32, and 64 processors (feel free to try as many threads as possible)
- Execute various problem-size instances
 - With multiple dimensions: Vary one parameter (e.g., number of nodes) and fix the other parameter (e.g., max record length) + vice versa
- Include a description of the hardware and software in the report
 - You can add interesting notes about the setup of the PBS scripts, including any special configurations or methods used to carry out the experiments



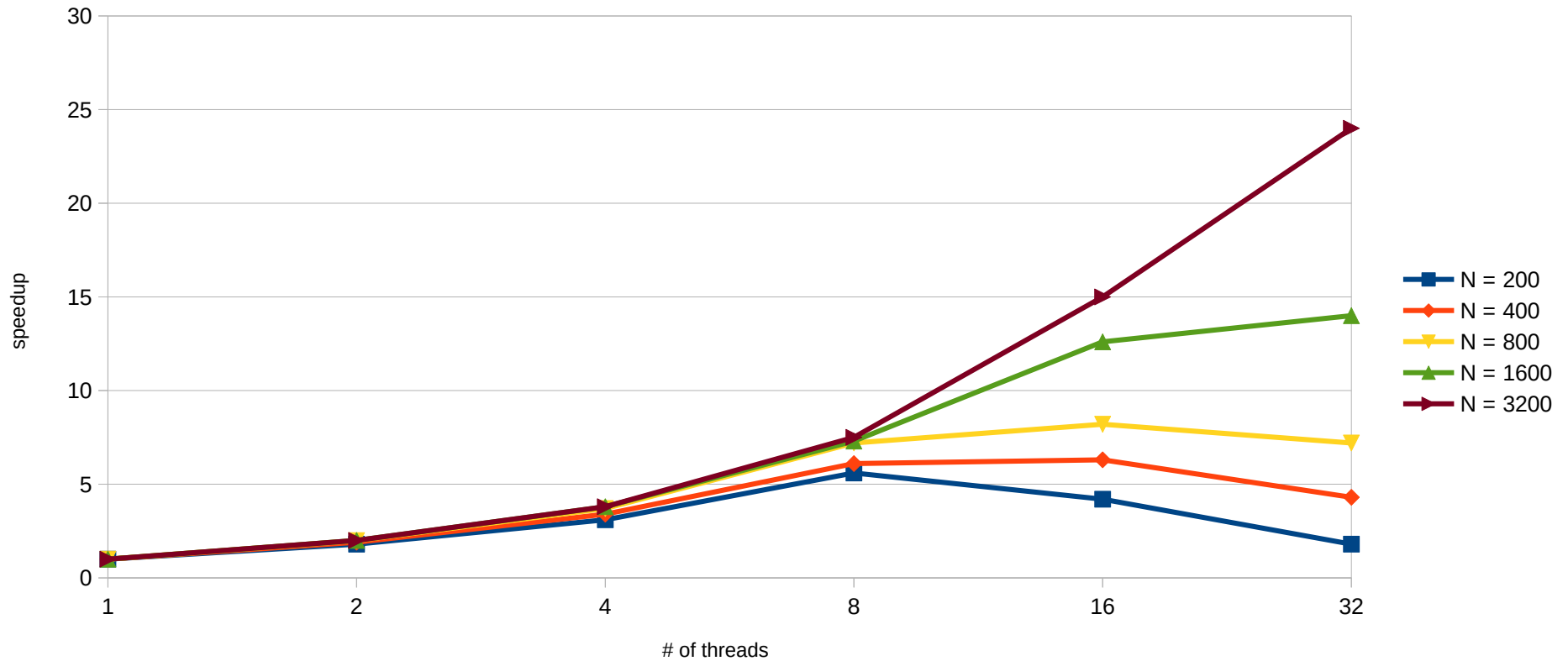
Scalability graph details

Scalability graph

- Show the speedup with respect to the number of threads used
- x – number of threads (p), y – speedup (S), z – problem-size (W)



Scalability graph example



- N – number of records (problem-size)



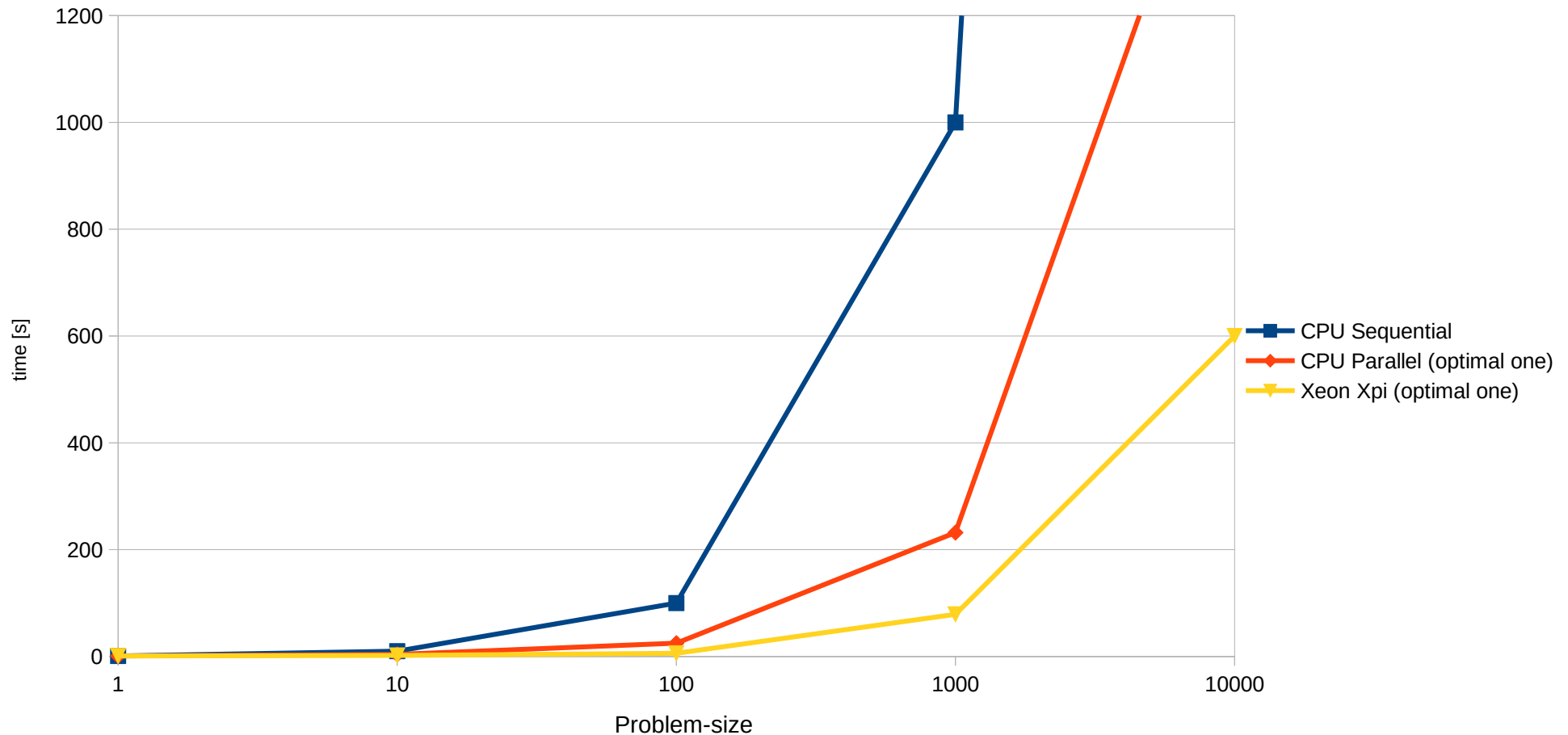
Performance graph details

Performance graph

- Show how much time the algorithm takes to complete the computation based on the number of records and their maximum length
- x – problem-size (W), y – execution time (T), z – number of threads (p)



Performance graph example



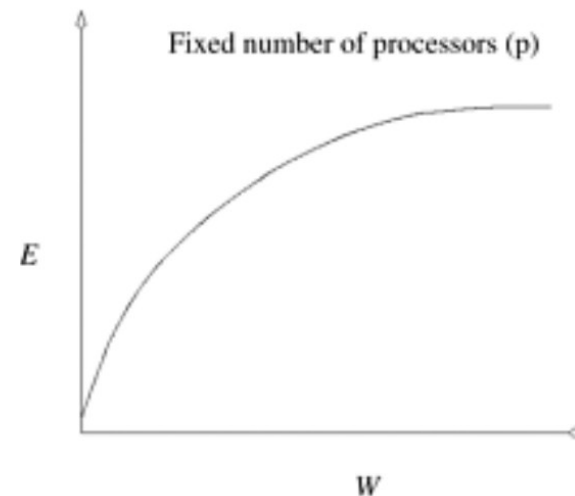
- Problem size with multiple dimensions - describe what you varying and what is fixed



Efficiency graph

Efficiency graph

- Show how efficiency changes in relation to problem-size
- x – problem-size (W), y – efficiency (E), z – number of threads (p)





Graphs: general requirements

- Each graph should have a title, a legend, and an appropriate format of axes (+ units)
- The message in the graphs should be easily recognizable (proper graph representation, colors)



Discussion and conclusion

- Discuss the results in relation to your expectations
- Explain what the most complicated part was and why the results are as provided
- What is the limiting factor of the parallelization in your algorithm