

Emerging parallel application or algorithm

A. Eftekhari

R. Janalik

J. Kardoš

O. Schenk

Faculty of Informatics

October 14, 2020



Introduction into problem

What is the scientific problem being solved?

List of the problems

- Introduction into problem scientific domain
- General problem definition
- Problem importance, motivation, solution outcome
- Problem solving performance objectives

Mathematical model

If you pick up the parallelization of an important algorithm, describe both the complexity of the sequential and the parallel algorithm.

- Approximation of problem using scientific model:
- Propositions & assumptions and their motivation (e.g. effects on computational complexity)
- One or multiple of the following:
 - Set of governing equations and boundary conditions with description of used variables
 - Definition of model states and transformation conditions
 - Flowchart of model system showing dependent physical/logical processes

Computational model

How well did the application achieve its scientific objective? Are simulation results compared to physical results?

Parallel numerical model implementation

What parallel platform has the application or the algorithm targeted?
(distributed vs. shared memory, graphical processing units, vector, etc.).
What tools were used to build the application or to implement the
algorithm? (languages, libraries, etc.)

- Target parallel platform/hardware architecture (distributed vs. shared memory, graphical processing units, vector, etc.).
- Languages, tools or libraries used for parallel implementation

Simulation & benchmarking results

If the application or the algorithm is run on a major supercomputer, where does that computer rank on the Top 500 list?

Does the application or the algorithm scale to large problems on many processors? If you believe it has not, what bottlenecks may have limited its performance?



Simulation & benchmarking results

How well did the application or the algorithm perform? How does this compare to the platform's best possible performance?

- Summarize the problem description and simulation results
- Characterize the quality of chosen numerical and computational methods wrt simulation results and achieved performance
- Propose parallel implementation enhancements to improve simulation performance
- Propose method enhancements to improve simulation detail/accuracy
- Estimate problem size/accuracy that shall show reasonably good performance on CSCS supercomputers