



BAND Performance Assessment Summary

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The BAND audit identified two underlying causes which could potentially improve parallel scaling and reduce run times. Further work (as a POP Performance plan) will target one of these issues, by investigating improvements to computationally imbalanced routines.

The audit report presents an analysis of strong scaling for a test case on 1-24 cores on shared memory hardware and 16-64 cores on a distributed memory HPC cluster. A range of performance metrics identifies suboptimal computational scalability plus computational imbalance as the main factors causing parallel inefficiency. In contrast MPI communication efficiency is good, i.e. only a small reduction in performance is due to data transfer and serialization.

The reduction in computational performance is in part caused by computational slow down (i.e. reducing [IPC](#)) on shared memory hardware and by increasing total computational work on distributed memory hardware, with no strong correlation between IPC and data cache misses on shared memory hardware. Using this analysis, improvements have already been implemented by SCM. Additional further work could identify code improvements via optimisations to computational scalability.

A full technical report can be found at https://pop-coe.eu/sites/default/files/pop_files/pop-ar-band.pdf

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Notices:

The research leading to these results has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No "676553".

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