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Optimization Studies of Millepede - a Detector Alignment Application [1]

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Optimization of a scientific application is not an easy task. It requires a broad knowledge and following a multiple-step methodology. In this work we have characterized and optimized a detector alignment software called Millepede II. We have focused on different performance levels: vectorization, parallelism, memory distribution. Also, the software was ported to Xeon Phi. For the characterization of the application we have used several tools including Intel Advisor and Intel VTune Amplifier. In this paper we show that there is some room for optimization without introducing massive modifications to the code. We obtain a speed-up of 15% by introducing changes in the code to ease the vectorization and by choosing the right scheduling for each parallel section of the code. Finally, we run the software on Xeon Phi, obtaining not satisfactory results due to the lack of adaptation of the software to the card?s hardware.
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