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Accelerating ROOT compression with Intel ISA-L library

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ROOT TTree has been widely used in the analysis and storage of various high-energy physical experiment data. The event data generated by the experiment is stored in TTree's bunch and further compressed and archived into a standard ROOT format file. At present, ROOT supports the compression storage of TBasket, the buffer of TBranch, using compression algorithms such as zlib, lzma, lz4, zstd, etc., and maximizes performance by using different compression algorithms in different scenarios, which is of great significance for the increasing amount of high-energy physical data. With the continuous improvement of hardware technology, it is possible to accelerate specific commonly used algorithms from the underlying hardware layer. In this article, by using ISA-L(The Intel Intelligent Storage Acceleration Library), the compression algorithm of ROOT is extended on the Intel X86 machine, enriching the options for ROOT data compression and further improving the comprehensive performance of TTree data compression. Performance tests on intel Xeon Silver 4215R CPUs indicate that the compression time using the ISA-L library is 25% higher than that of the ZSTD algorithm, and the compression rate is slightly better than ZSTD, but the decompression speed is slower than ZSTD. Adding ISA-L support to root allows users to choose more compression methods and effectively reduces compression time.

Significance

Adding ISA-L support to root allows users to choose more compression methods and effectively reduces compression time.

References

Experiment context, if any

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