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Design and implementation of zstd compression algorithm for high energy physics experiment data processing based on FPGA

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With the continuous increase in the amount of large data generated and stored in various scientific fields ,such as cosmic ray detection, compression technology becomes more and more important in reducing the requirements for communication bandwidth and storage capacity. Zstandard, abbreviated as zstd, is a fast lossless compression algorithm. For zlib-level real-time compression scenarios, it can have a good compression ratio and a faster speed than similar algorithms. In this paper, we introduce the architecture of a new zstd compression kernel, and combine it with the root framework (an open-source data analysis framework used by high energy physics and others), and optimize the proposed architecture for the specific use case of lhaaso km2a data decode. The optimized kernel is implemented on Xilinx alveo U200 board.

Significance

References

Experiment context, if any

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