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RNTupleInspector: A storage information utility for RNTuple

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Inspired by over 25 years of experience with the ROOT TTree I/O subsystem and motivated by modern hardware and software developments as well as an expected tenfold data volume increase with the HL-LHC, RNTuple is currently being developed as ROOT's new I/O subsystem. Its first production release is foreseen for late 2024, and various experiments have begun working on the integration of RNTuple with their existing software frameworks and data models. To aid developers in this integration process, and to help them further understand and monitor the storage patterns of their data with RNTuple, we have developed the RNTupleInspector utility interface, which will be available with every ROOT installation that includes RNTuple. The RNTupleInspector provides storage information for full RNTuples as well as specific fields or columns, and is designed in such a way that it can be used as part of a larger monitoring tool as well as in an exploratory manner, for example through the ROOT interpreter. In this contribution, we will discuss the motivation and design considerations behind the RNTupleInspector and demonstrate its use through example use cases.

Significance

As RNTuple becomes more mature in preparation for its first production release, it becomes essential for software developers of experiments as well as RNTuple to understand how different data models and I/O parameters affect the storage efficiency of RNTuple. The RNTupleInspector utility is meant to provide insights into these aspects and can aid in designing an optimal RNTuple I/O parameter configuration and monitoring the storage behaviour of different data sets.

References

Experiment context, if any

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