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Efficient Access to Remote Data in High Energy Physics

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Particle accelerators produce huge amounts of information in every
experiment and such quantity cannot be stored easily in a personal
computer. For that reason, most of the analysis is done using remote
storage servers (this will be particularly true when the Large Hadron
Collider starts its operation in 2007). Seeing how the bandwidth has
increased in the last few years, the biggest problem of this approach
at the moment is latency, which hurts considerably the performance
of the analysis process.
Fortunately, particle events are independent of each other, which
allows us to transfer the information that must be processed in the
future while analyzing the data at hand. The independent nature also allows us
to transfer many events instead of the single one needed at a
given time. Such ideas are implemented in the data analysis framework
ROOT, and its file servers (rootd, xrootd and a http plugin).
Among the techniques used, we have pre-reads, pre-fetching,
parallel streams and atomic readings for multiple requests.
All these strategies present an enormous advantage and will facilitate
processing remote files at almost the same speed as local ones, as
long as the bandwidth does not present any limitations.

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