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AMBER experiment's online filter system for virtualised IT infrastructure

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High-energy physics experiments require significant computing resources to operate their high-level trigger systems. Typically, these systems are constructed as extensive computing farms with cutting-edge expensive hardware to provide sufficient computing power. Usually located on-site, these systems process detector data in real time and minimize their latency. In this paper, we present an alternative high-level filter system specifically designed for the AMBER experiment at CERN. The novelty of our approach lies in its high efficiency, which eliminates the need for a dedicated on-site computer farm. Instead, it makes use of existing shared resources housed in the CERN data center. The proposed system efficiently handles the data generated by the medium-sized experiment and performs numerous parallel filtering tasks in an online fashion. All system components operate within a shared, fully virtualized environment, including databases, storage, and processing units. This flexible environment scales effectively, allowing adjustments to allocated resources based on agreements with service managers. We present the architectural design and the implementation of such a system. To demonstrate its capabilities, we have conducted various measurements assessing its performance, latencies, and stability under maximum (expected) loads. These results demonstrate the resilience and reliability of the filtering system while optimizing overall costs to a minimum.

Minioral

Yes

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No

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Yes

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