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An Online system based (almost exclusively) on off-the-shelf hardware for a trigger-free read-out of the LHCb experiment

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Abstract:
LHCb has decided to optimise its physics reach by removing the first level hardware trigger for LHC Run3 and beyond. In addition to requiring fully redesigned front-end electronics this design creates interesting challenges for the data-acquisition and the rest of the Online computing system. Such a system can only be realized within realistic cost using as much off-the-shelf hardware as possible. Relevant technologies evolve very quickly and thus the Online system design is architecture-centered and tries to avoid to depend too much on specific features.
In this paper I will describe the design, the motivations for various choices and the current favored options for the implementation, and the status of the R&D. I will cover the back-end readout, which contains the only non-COTS building block, the event-building, the high-level trigger infrastructure and storage and I will also discuss plans for data-flow and the control-system, which will be put in place to configure, control and monitor the entire hard- and software infrastructure.

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