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The CMS Data Quality Monitoring Software: experience and future improvements.

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The Data Quality Monitoring (DQM) Software proved to be a central tool in the CMS experiment. Its flexibility allowed its integration in several environments: Online, for real-time detector monitoring; Offline, for the final, fine-grained Data Certification; Release-Validation, to constantly validate our reconstruction software; in Monte Carlo productions. The central tool to deliver Data Quality information is a web site for browsing data quality histograms (DQMGUI). In this presentation we will illustrate the usage of the DQM Software in the different environments, its integration in the CMS Reconstruction Software Framework (CMSSW) and in all production workflows, focusing in particular on its interplay with the ROOT package. Special attention will also be dedicated to the DQMGUI server design and features, especially the web-based interactive rendering. We discuss the main technical challenges and our solutions to them, with emphasis on functionality, long-term robustness and performance. We will also report our experience in operating the DQM systems over the past years, its limitations and our suggestions in the view of the upcoming CMS upgrades during the LHC long shutdown.

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