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The Cherenkov Telescope Array production system for Monte Carlo simulations and analysis

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The Cherenkov Telescope Array (CTA) –an array of many tens of Imaging Atmospheric Cherenkov Telescopes deployed on an unprecedented scale –is the next-generation instrument in the field of very high energy gamma-ray astronomy. An average data stream of about 0.9 GB/s for about 1300 hours of observation per year is expected, therefore resulting in 4 PB of raw data per year and a total of 27 PB/year, including archive and data processing. The start of CTA operation is foreseen in 2018 and it will last about 30 years. The installation of the first telescopes in the two pre-selected locations (Paranal ESO, Chile and La Palma, Spain) will start in 2017. In order to select the best site candidate to host CTA telescopes (in the North and in the South hemispheres), massive Monte Carlo simulations have been performed since 2012. Once the two sites have been selected, we have started new Monte Carlo simulations to determine the optimal array layout with respect to the obtained sensitivity. Taking into account that CTA may be finally composed by 7 different telescope types coming in 3 different sizes, many different combinations of telescope position and multiplicity as a function of the telescope type have been proposed. This last Monte Carlo campaign represented a huge computational effort, since several hundreds of telescope positions have been simulated, while for future instrument response function simulations, only the operating telescopes will be considered. In particular, during the last 8 months, about 1.4 PB of MC data have been produced and processed with different analysis chains, with a corresponding overall CPU consumption of about 125x106 HS06 hours. In these proceedings, we describe the employed computing model, based on the use of grid resources, as well as the production system setup, which relies on the DIRAC (Distributed Infrastructure with Remote Agent Control) framework. Finally, we present the envisaged evolutions of the CTA production system for the off-line data processing during CTA operations and the instrument response function simulations.

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