Simulation production and reprocessing for LHC

The needs of the simulation of physics samples for a general purpose LHC experiment like CMS are driven by the large number and complexity of the physics processes involved in pp collisions. This implies the generation of many different final states, with possible different phase space selections, and the usage of a variety of calculations and models based on different assumptions and levels of approximation in the physics description. Since the simulated events are fully reconstructed up to analysis level objects, re-processing of data using improved reconstruction algorithms, detector calibrations and alignment usually implies a similar re-processing of the corresponding simulated data. From the computational point of view all these activities translate into the need of managing several thousands of different workflows in order to satisfy the simulation needs related a single period of data taking. The necessity of effectively managing the flow of actions implied by each requested sample and of storing of the corresponding information in a user friendly format has suggested the development of a dedicated tool, PREP.

Logical flow of actions

Campaign: a collection of samples produced with the same release cycle and a homogeneous set of conditions. Simulation campaigns can be either production ones (starting from event generation and detector simulation) or re-processing ones (pile-up and electronics simulation and/or reconstruction).

Request: a single sample corresponding to a user defined process/generator/model/conditions belonging to a specified campaign.

Request filters

User interfaces: production management and data retrieval

There are two main views accessible in PREP: Campaign Management and Request Management. The former provides production managers with a tool to define the characteristics of a given production campaign, in terms of release and condition versions to be used, workflow list to be run, and ensure all the concerned software coordinators can approve the chosen settings. At the same time it provides a reference for any user of that campaign about its general settings. The Request Management view provides the list of sample definitions, it is used to manage the whole life cycle of each request, from its submission by the physics groups till its completion and storage in the catalogue. At the same time it is the main source of information for analysts who want to know both the status of the request, and to retrieve all the physics parameters associated to it.