

21st International Conference on Computing in High Energy and Nuclear Physics (CHEP2015)



Contribution ID: 225

Type: oral presentation

AsyncStageOut: Distributed user data management for CMS Analysis

Monday, 13 April 2015 15:45 (15 minutes)

AsyncStageOut (ASO) is a new component of the distributed data analysis system of CMS, CRAB, designed for managing users' data. It addresses a major weakness of the previous model, namely that data movement was part of the job execution resulting in inefficient use of job slots and an unacceptable failure rate at the end of the jobs.

ASO foresees the management of up to 400k files per day of various sizes, spread worldwide across more than 60 sites. It must handle up to 1000 individual users per month, and work with minimal delay. This creates challenging requirements for system scalability, performance and monitoring.

ASO uses FTS to schedule and execute the transfers between the storage elements of the source and destination sites. It has evolved from a limited prototype to a highly adaptable service, which manages and monitors the user file placement and bookkeeping. To ensure system scalability and data monitoring, it employs new technologies such as a NoSQL database and re-uses existing components of PhEDEx and the FTS Dashboard.

We present the asynchronous stage-out strategy and the architecture of the solution we implemented to deal with those issues and challenges. The deployment model for the high availability and scalability of the service is discussed. The performance of the system during the commissioning and the first phase of production are also shown, along with results from simulations designed to explore the limits of scalability.

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Session Classification: Track 4 Session

Track Classification: Track4: Middleware, software development and tools, experiment frameworks, tools for distributed computing