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An Xrootd Italian Federation for CMS

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The Italian community in CMS has built a geographically distributed network in which all the data stored in the Italian region are available to all the users for their everyday work. This activity involves at different levels all the CMS centers: the Tier1 at CNAF, all the four Tier2s (Bari, Rome, Legnaro and Pisa), and few Tier3s (Trieste, Perugia, etc). The federation uses the new network connections as provided by our NREN, GARR, which provides a minimum of 10 Gbit/s to all the sites via the GARR-X project. The federation is currently based on Xrootd technology, and on a redirector aimed to seamlessly connect all the sites, giving the logical view of a single entity. A special configuration has been put in place for the Tier1, CNAF, where ad-hoc Xrootd changes have been implemented in order to protect the tape system from excessive stress, by not allowing WAN connections to access tape only files, on a file-by-file basis. We will describe in details the test carried on the authentication and authorization capabilities in the Xrootd code, in order to achieve a better fine grained authorization criteria. For example with this authentication mechanism it is possible to implement a protection on the base of VOMS attributes and the group and roles. In order to improve the overall performance while reading files, both in terms of bandwidth and latency, it is implemented a hierarchical solution for the xrootd redirectors. The solution implemented provides a dedicated redirector where all the INFN sites are registered, without considering their status (T1, T2, or T3 sites). This redirector is the first option for the end user where they can read files both in the CMSSW framework and using bare ROOT Macros. This redirector is used also to publish information of sites that do not provide official Service Level Agreement to CMS, so that could not join the official CMS redirector. An interesting use case were able to cover via the federation are disk-less Tier3s. For sites where local manpower and/or funding does not allow the operation of a storage system, CMS analysis is still allowed by serving all the input files via WAN; the option of a local frontend cache protects the infrastructure from excessive data transfers in this case. The caching solution allows to operate a local storage with minimal human intervention: transfers are automatically done on a single file basis, and the cache is maintained operational by automatic removal of old files.

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