Contribution ID: **446** Type: **oral presentation**

ALICE Multi-site Data Transfer Tests on a Wide Area Network

Thursday, 30 September 2004 14:20 (20 minutes)

Next generation high energy physics experiments planned at the CERN Large Hadron Collider is so demanding in terms of both computing power and mass storage that data and CPU's can not be concentrated in a single site and will be distributed on a computational Grid according to a "multi-tier".
LHC experiments are made of several thousands of people from a few hundreds of institutes spread out all over the world. These people, according to their collaborations on specific physics analysis topics, can constitute highly dynamic Virtual Organizations rapidly changing as a function of both time and topology. The impact of future experiments on Wide Area Networks (WAN) will be non negligible especially for what concerns the capillarity of bandwidths (down to the "last mile"), quality of service, adaptivity and configurability.
In this paper we report on a series of multi-site data transfer tests performed within the ALICE Experiment on a wide area network test-bed in order to spot possible bottlenecks and pin down critical elements and parameters of actual research networks.
In order to make the tests as realistic as possible, reflecting the real use cases foreseen in the next future, we have taken into account all the aspects of the elements involved in the transfer of a file:
- Local disk Input/Output (I/O) performance;
- I/O block size;
- TCP parameters and number of parallel streams;
- Bandwidth Delay Product (BDP) expressed as the product of the Bandwidth (BW)
times the Round Trip
Time (RTT).

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Session Classification: Wide Area Networking

Track Classification: Track 7 - Wide Area Networking