

High Performance Data Transfer and Monitoring for RHIC and USATLAS

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Modern nuclear and high energy experiments yield large amounts of data and thus require efficient and high capacity storage and transfer. BNL, the hosting site for RHIC experiments and the US center for LHC ATLAS, plays a pivotal role in transferring to and from other sites in the US and around the world in a tiered fashion for data distribution and processing. Each component in the infrastructure from data acquisition system to local analysis facility must be monitored, tested, and tuned to transfer such a sheer volume of data over such long distance.

BNL deploys monitoring tools such as Cacti and Ganglia and testing tools such as iperf, perfonar, and Bbcp, and has also created its own tools: 1) an automatic iperf tcp tuning tool for recording and graphing various combinations of critical TCP parameters to determine the optimal combination, and 2) the hierarchical monitoring tool for performing tests at various middleware levels such as network, gridftp, FTS and graphing them in a web service framework. It becomes easier through the use of these tools to determine optimal TCP settings and isolate problems with a network device, host network adapter, disk storage, or a particular layer of the data transfer software stack.

Before and after results from tuning are usually drastic, often yielding more than ten fold increase in transfer rate. This was seen in all of our tests from BNL to and from it's USATLAS tier 2 sites, from BNL RHIC experiment data acquisition systems to the computing center in Japan (CCJ) on behalf of the PHENIX experiment, and to the Korea Institute of Science and Technology Information (KISTI) on behalf of the STAR experiment. The outcomes of this work are being integrated into: 1) the global data taking and reconstruction framework for RHIC experiments to leverage the computing resources of RHIC international collaborators, and 2) the ATLAS production and analysis framework to allow USATLAS regional centers to do data processing.

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