

Errors and error handling in the ATLAS HLT/DAQ system: definition of the issue

Architecture Working Group
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Background and Problem Statement

The important characteristic of the DAQ system is reliability and fault-tolerance. It has to provide safe and fast error detection and recovery mechanism since malfunctioning of the DAQ system may have a non-negligible impact to the experiment efficiency. Since the ATLAS HLT/DAQ system is composed of sub-systems which are developed independently, there are two main kinds of errors which must be recognised and handled in the system:

- sub-system internal errors which can be handled by the sub-system itself without affecting all the neighboring sub-systems
- errors produced by other sub-systems and which have to be handled either by the sub-system that determined them or at the global DAQ system level

The second case clearly indicates the importance of having common error handling facility which spans across all the HLT/DAQ sub-systems. Creation of such common error facility requires that the following issues have to be addressed in a common way across all the HLT/DAQ sub-systems:

- error classification
- error reporting and logging system
- error handling mechanism

These issues are discussed in more details in the Connect Forum proposal that has been presented at the TDAQ steering group 07/10/02 (<http://documents.cern.ch/AGE/current/fullagenda.php?ida=a021232>). ***The AWG adheres to the proposal of the Connect Forum of having a dedicated working group that should address these issues.***

Another issue related to the errors is an impact which errors may provide to the DAQ system functionality. As a consequence the design of the HLT/DAQ sub-systems may be affected. These consequences have to be understood and taken into account for the sub-systems design. This implies that in each of the HLT/DAQ sub-systems a study should be done aiming with the description of the possible errors and their implication to the sub-system itself and to the whole DAQ system. In particular for each HLT/DAQ sub-system the following questions should be addressed:

- what are the possible internal errors for the sub-system?
- what are the possible external errors which affect this sub-system?
- how these errors can be detected?
- what other sub-systems (or components) are affected by these errors?
- what is the impact for the whole DAQ system?
- can these errors be recovered and what is the procedure?
- how much time it may take to recover the error?

The sub-systems may provide error description in a form of scenarios as part of the sub-system design.

The last issue related to the errors is policy (quantitative) for spare equipment, in particular as regards to critical (single point of failure) components (e.g. DFM, RoIB). *These latter should be identified.*

Proposal for action

- The Connect Forum proposal to form a working group, to address the issues of common error definitions, handling and logging, is supported.
- TDAQ sub-systems should be required to provide, as part of the designs of components, scenarios for the implication of errors (internal or external) on the component itself.
- The architecture working group will identify, and discuss in open meetings, critical components (in particular single points of failure).
- It is suggested that a person be appointed by the TDMT to coordinate the different activities related to errors.