1. Introduction to COMA

The COMA System (Conditions/Configuration Metadata for ATLAS), has been developed to manage the inherently non-literal metadata needed to readily access it. It is based on a relational database storing directly extracted, refined, and reduced, and derived information from system data sources as well as metadata information from other databases. This information facilitates a variety of unique dynamic interfaces and provides information to enhance the functionality of other systems. COMA is the central metadata databases metadata in ATLAS, fitting nicely between the AMI and TAG databases, which store metadata at the dataset and event-levels, respectively. The data sources of each of these metadata databases is shown below:

- **COMA data sources include:**
  - **Conditions database:** A wide variety of configuration information and measured conditions at the Run and Luminosity Block (LB) levels. An ATLAS Run is a interval of data taking (generally for many hours) with a fixed configuration, with selected configurations allowed to change at the sub-run (or LB) level.
  - **Trigger database:** Trigger specific information not readily accessible or available via the Conditions database for collison data and Monte Carlo (MC) datasets.
  - **Tier-0 and TAG Catalog databases:** Information from these systems is used to create an “analytical” interest for upload into COMA (as a subset of all ATLAS Runs). For those Runs, we collect a variety of information about the processing of those Runs. Via the TAG Catalog, COMA interfaces also have access to which processing versions are available in the TAG database.
  - **AMI database:** AMI and COMA systems work symbiotically to store a variety of information about collections of Runs and their processing, making the data available to both systems.
  - **Other:** Information from a variety of non-databases: TWiki and other documentation, test and unit files, human entry.

2. Overview of the COMA Schema:

- **The COMA database schema currently contains 68 tables and 12 views.** It includes sets of tables dedicated to metadata related to data quality, trigger and prescales, data periods, loading status, general run properties, event counts, luminosity and beam related entries. In addition, COMA has a set of tables which offer an overview of the ATLAS Conditions database structure and versioning.
- **The principles of COMA database design are tightly coupled to the structure of ATLAS systems and how they interrelate, the nature of the source data and its handling in deriving useful metadata quantities and how it is used in the client interface.**
- **Loading progresses in 8 distinct stages, each of which loads a group of logically related tables. These stages are decoupled to allow interrelated systems to load independently; flexibly in scheme evolution and program development; Decoupling of synchronizing with their sources.
- **The implementation of each loading stage includes business rules which dictate how the data is managed, including what happens if some or all of related source data is absent.**

4. COMA Report Overview and Example

- **COMA Interfaces are based on PHP and javascript, using some features of the jQuery utility helps filter results.**
- **General Features of COMA Reports:**
  - The scope of each report is a coherent and manageable collection of related information, providing hyperlinks to more detailed information from COMA or external systems that it is possible and logical to do so.
  - Input criteria is read via GET methods (POST input also recognized) and is always shown in the report header. Input keywords are compact and meaningful. Input criteria is flexible, allowing ranges of values and is applied in a case-insensitive manner.
  - Values highlighted within reports to show more detailed information.
  - Tabulated content is compact but offers users pop-up explanations of content which exploit self-documenting features built into the COMA schema.

A COMA Single-Run Report is shown below to demonstrate some of the functionality of the interfaces and exhibit aspects of COMA content.