THE ATLAS MUON CONDITIONS DATABASE

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ATLAS

MUON SYSTEM
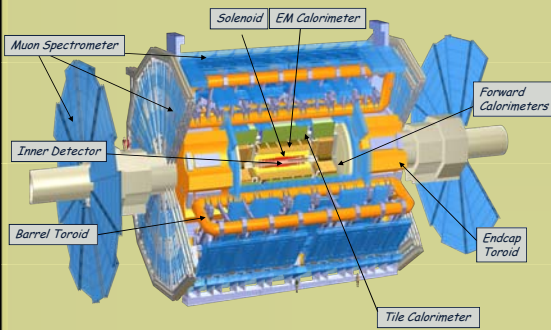
Cathode-Strip Chambers (CSC) : 32 chambers, 31k channels
Monitored Drift Tube (MDT): 1108 chambers, 339k channels
Thin Gap Chambers (TGC): 3588 chambers, 359k channels
Resistive Plate Chambers (RPC): 560 chambers, 359k channels

- **RPC & TGC:** Trigger the detector and measure the muons in the xy and Rz planes with an accuracy of several mm.
- **CSC:** Measure the muons in Rz with ~80 μm accuracy and in xy with several mm. Cover $2<|\eta|<2.7$
- **MDT:** Measure the muons in Rz with ~80 μm accuracy Cover $|\eta|<2$
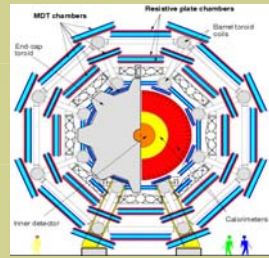

STORAGE ISSUES

Most of these non event-data are stored in dedicated ATLAS databases following the ATLAS DataBase Model.

ORACLE DBs:
Reference DB designed by the detector experts, used to store a fine granularity information (i.e. Calibration and alignment DB, Configuration DB, Trigger and DAQ DB)

COOL DB:
Conditions Databases defined and organized centrally by ATLAS DB Management.
Extensively used in each reconstruction job within the ATHENA framework. Subset of the information contained in the ORACLE DBs.
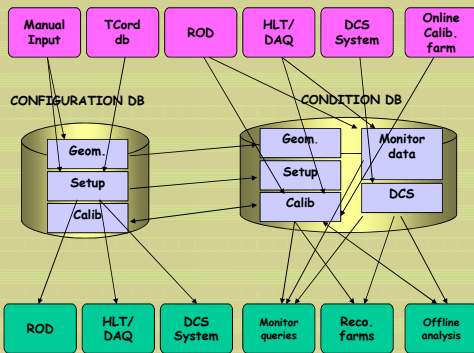
REQUIREMENTS

RECONSTRUCTION CHALLENGE: good resolution in the timing, p_T and position measure to achieve the physics goals. Detailed monitoring of each sub-detector parts.

Need to storage a huge amount of data:
- Calibration parameters
- Alignment constants from sensors and from tracks
- Data Quality Monitoring Flags
- Data Quality final flags (R,G,Y)
- Temperature map and B field map
- DCS information
- DAQ run information
- Sub-Detector Configuration parameters

CONDITION DATABASE

The ConditionDB is accessed by the offline reconstruction framework (ATHENA).
The interface is provided by COOL (COnditions Objects for LHC), implemented using CORAL: LCG RelationalAccessLayer software which allows database applications to be written independently of the underlying database technology.
- COOL databases can be stored in Oracle, in MySQL or in SQLite.
- Database schema optimized for IOV retrieval & look-up

COOL implements an interval of validity database. Objects stored or referenced in COOL have an associated start and end time between which they are valid.
COOL data are stored in folders (tables), within each folder, several objects of the same type are stored, each with their own interval of validity range.
The data are stored in the PAYLOAD, associated with a channelId number.

Since (Time)	Until (Time)	ChannelId (Integer)	Payload (Data)	Tag (String)

The Reconstruction job, inside ATHENA, read it back using the IoVService and, if necessary, unpacks them via tool-algorithms, storing all in the TDS Containers.