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ATLAS ITk Production Database use and tools

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The ATLAS experiment will undergo major upgrades for operation at the high luminosity LHC. The high pile-up interaction environment (up to 200 interactions per 40MHz bunch crossing) requires a new radiation-hard tracking detector with a fast readout.

The scale of the proposed Inner Tracker (ITk) upgrade is much larger than the current ATLAS tracker. The current tracker consists of ~4000 modules while ITk will be made of ~28,000 modules. To ensure a good production quality, all the items to build modules as well as bigger structures on which they will be placed need to be tracked along with the relevant quality control and quality assurance information. Hence, the ITk production database (PDB) is vital to follow the complex production flow for each item and institutes around the globe. The database also allows close monitoring of the production quality and production speed. After production the information will be stored for 10 years of data-taking to trace potential operational issues to specific production items.

A PDB API allows development of tools for database interaction by different user types: technicians, academics, engineers and vendors. Several options have been pursued to meet the needs by the collaboration: pythonic API wrapper, data-acquisition GUIs with integrated scripts, commandline scripts distributed via git repositories, containerised applications, and CERN hosted resources.

This presentation promotes information exchange and collaboration for tools which supports detector construction in a large-scale experiment. Examples of front-end development and reporting will be shown. Through these examples, the general themes of large-scale data management and multi-user global accessibility will be discussed. These concepts are relevant not only for modern high-energy particle physics (HEP) but also for large experiments beyond HEP.

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