ALBA Equipment Protection System, Current Status

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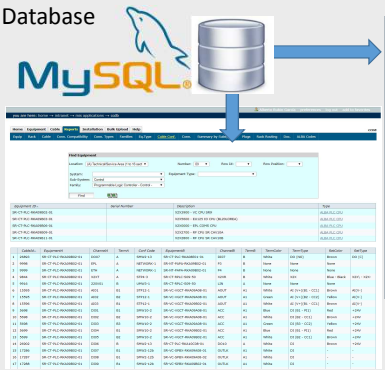
*ALBA is a 3GeV Synchrotron facility in Barcelona (Catalonia, Spain, EU), with **8 operational beamlines** and **3 in construction**. EPS PLC systems at ALBA are used for protection as well as diagnostics and monitoring.*

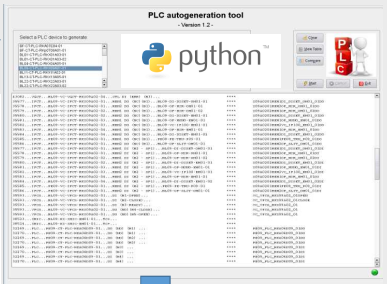
The integration of the management of an independent system like EPS in the TANGO Control System required several phases, starting from the **collecting requirements**, EPS engineer will define equipment and cables needed in **Cabling Database**. The CCDB python API provides full access to the Cabling Database from our control system tools. The API methods allow to search for equipments and get lists of cables, connections, names and network information. These links are used to enable our **Auto-Generation** coding tool correlating the information of the equipments from the CCDB with the logics defined for them in the EPS. These steps do not produce the complete final code of the PLC but a **detailed guide of the code and data structures to be used in the software project tasks**.

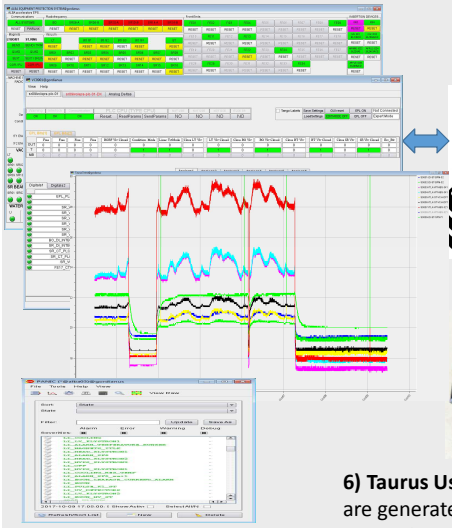
The **control engineer then must coordinate logics of individual variables** and program the most specific logics of every beamline or accelerators section, being capable of **focusing in the most critical** parts instead of the tedious, systematic and iterative variable naming task. The final output of the Auto-generation process is the modbus' variable mapping spreadsheet, commonly known as the EPS CSV. This file will be used later to generate the **EPS Expert GUI** and the **TANGO Attributes** used by User-Level GUI's.

1) Collect **requirements**.
2) Define equipment and cables in **CCDB** Cabling Database



3) Using **python-based** tools we Auto-generate the variables naming, some PLC standard tasks and mapping that will be used in PLC programs, and later exported to **TANGO** attributes using Modbus protocol and PyPLC device servers





4) PyPLC device attributes are imported from PLC project or created on demand from 1-line formulas in the Tango Database.

5) Once all standard tasks has been generate**, EPS Controls engineer define the logic** to be implemented the project is loaded in the PLC.

6) Taurus User Interfaces to PyPLC devices are generated dynamically, reloading changes on attributes lists and their alarm / status configuration.

7) Tango **Dynamic Attributes** allowed to extend PLC's behavior and automate high level actions, either from our Alarm System (**PANIC**) or our **Sardana** Macro Executor.

- We successfully **automated the integration of PLC's in Tango**, allowing high level customization of PLC variables and its behavior. It reduced the number of changes needed in protection systems PLC's while boosting the scientist interaction with the system.

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