

TileCalibWeb Robot tool for ATLAS Calorimeter conditions and calibrations data handling in Run 3

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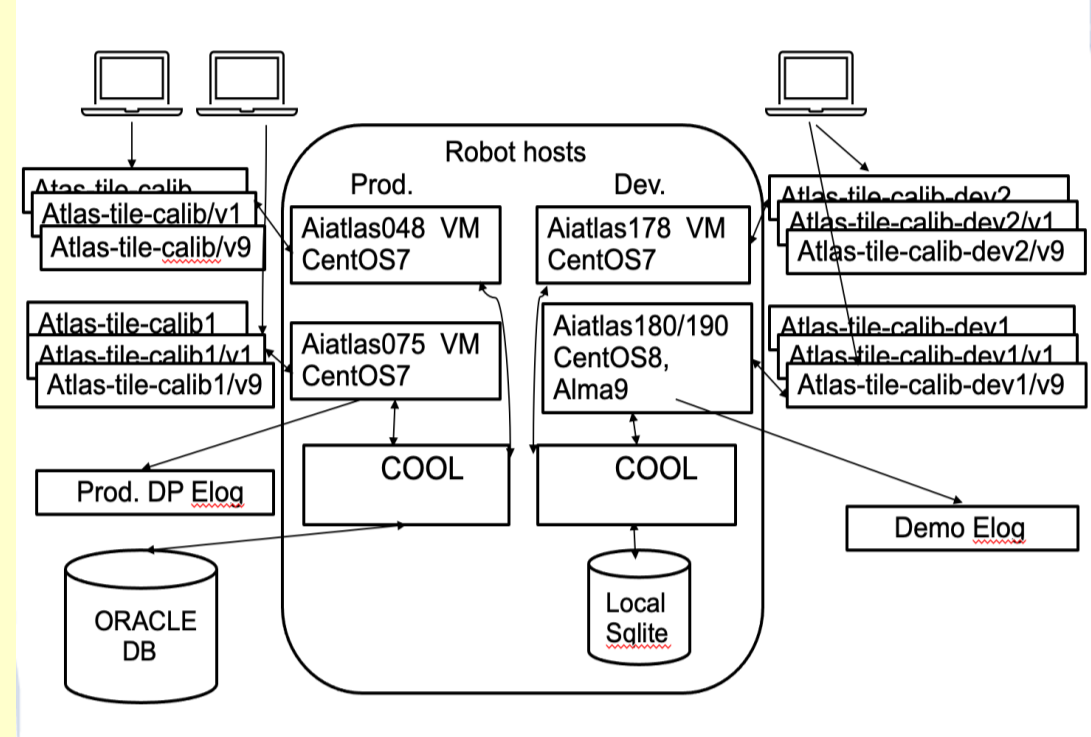


1. Introduction

Every sub-detector in the ATLAS experiment at the LHC, including ATLAS Calorimeter, writes conditions and calibration data into an ORACLE Database (DB). In order to provide an interface for reliable interactions both with the Conditions Online and Offline DBs a unique semiautomatic web based application, TileCalibWeb Robot, has been developed. TileCalibWeb is being used in LHC Run 3 by ATLAS Calorimeter data preparation, data quality and calibration experts as well as by shifters on duty. The architecture and functionality of the tool is discussed. Use cases for updating the conditions data of various types and formats are presented. The interface provides the user with the option to choose the strategy of the DB update. Options include a short text input typed directly into the browser as well as more complicated methods using data files prepared in advance. TileCalibWeb significantly simplifies the procedure of the preparation and writing of the conditions and calibration data both into Online and Offline DBs in parallel, verifies user input and automatically publishes bookkeeping records.

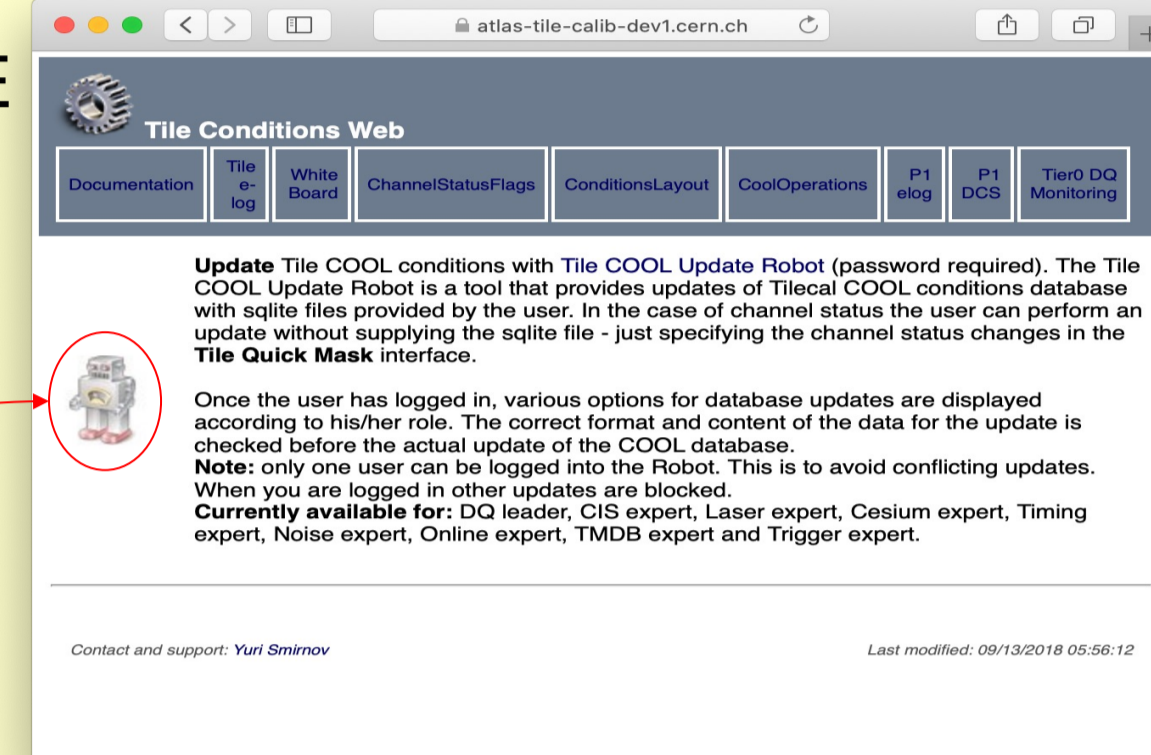
2. TileCalibWeb Robot design

- 4 VM nodes at CERN – 2 production, 2 development
- Each Robot node can work with 10 users (10 URLs).
- Production instance writes into ORACLE COOL DB, development one - with local Sqlite DB replica.
- Conditions DB update completes with an automatic bookkeeping Elog record publishing.



3. Authentication and Authorization

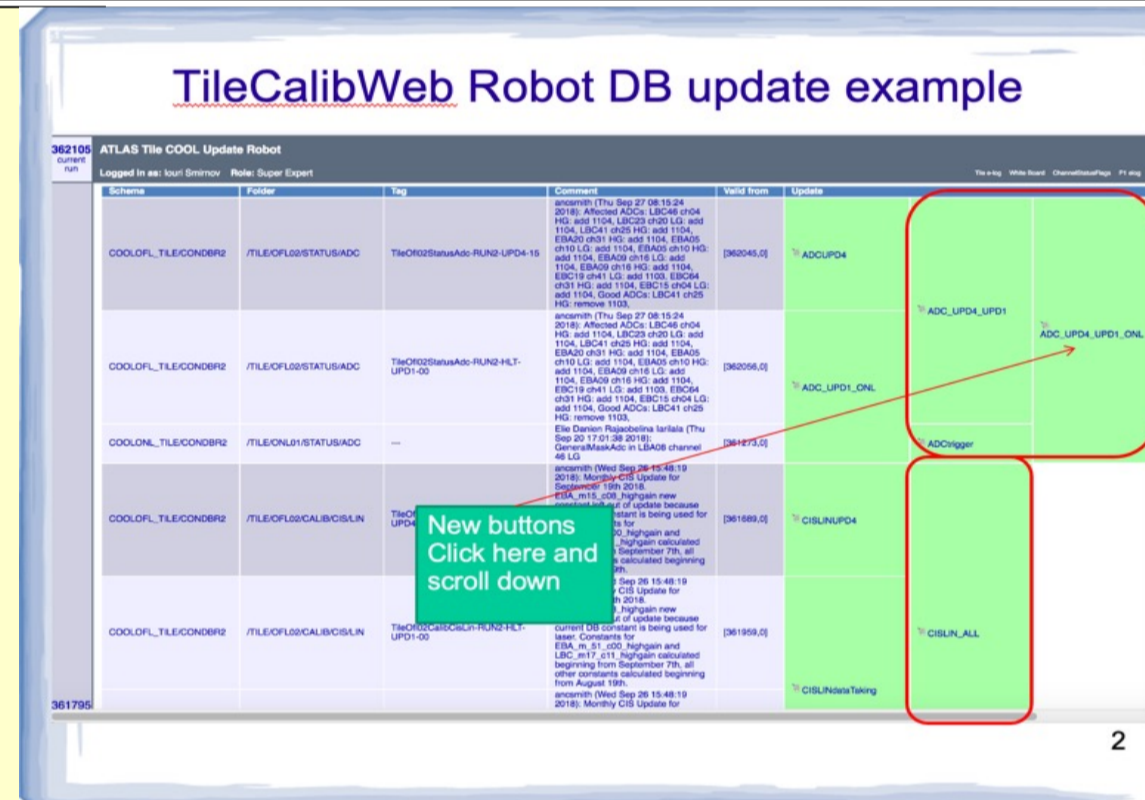
- TileCalibWeb Robot works with both Offline and Online ORACLE COOL Conditions Databases. Details of the Tile Calorimeter (TileCal) COOL Conditions DB structure described in [1].
- Access to Robot through CERN Single Sign-On (SSO).
- User roles assigned by CERN e-mail address.
- User can see and update only DB folders associated with role.
- Activates by clicking on the "Robot" icon.



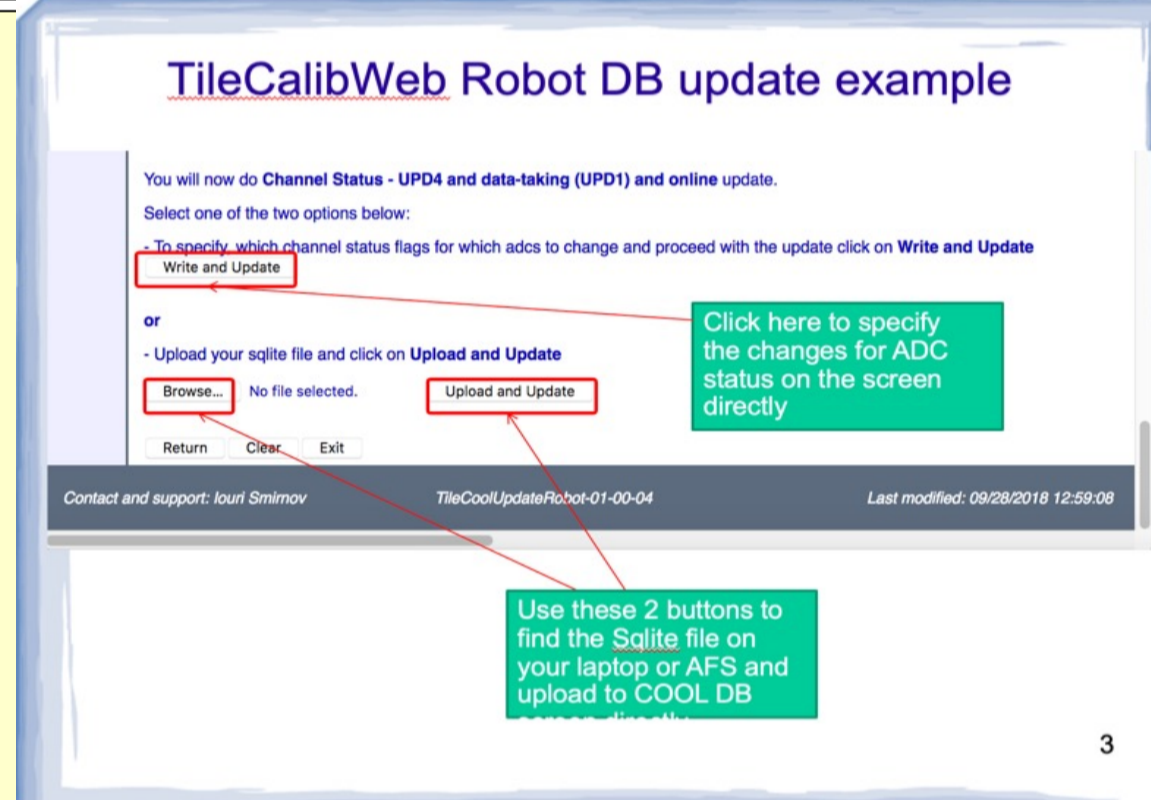
4. Procedure of Conditions Database update

We use two types of Conditions DB updates: 1) a large DB update via Sqlite file upload, or 2) minor correction of a few COOL channels by adding new Interval of Validity (IOV) to existing tag using TileCalibWeb Robot interface. There are 3 different scenarios of updates using Robot: **a) bad channels masking** (example below), **b) updating of calibration constants**, **c) fixing timing jumps during a run**.

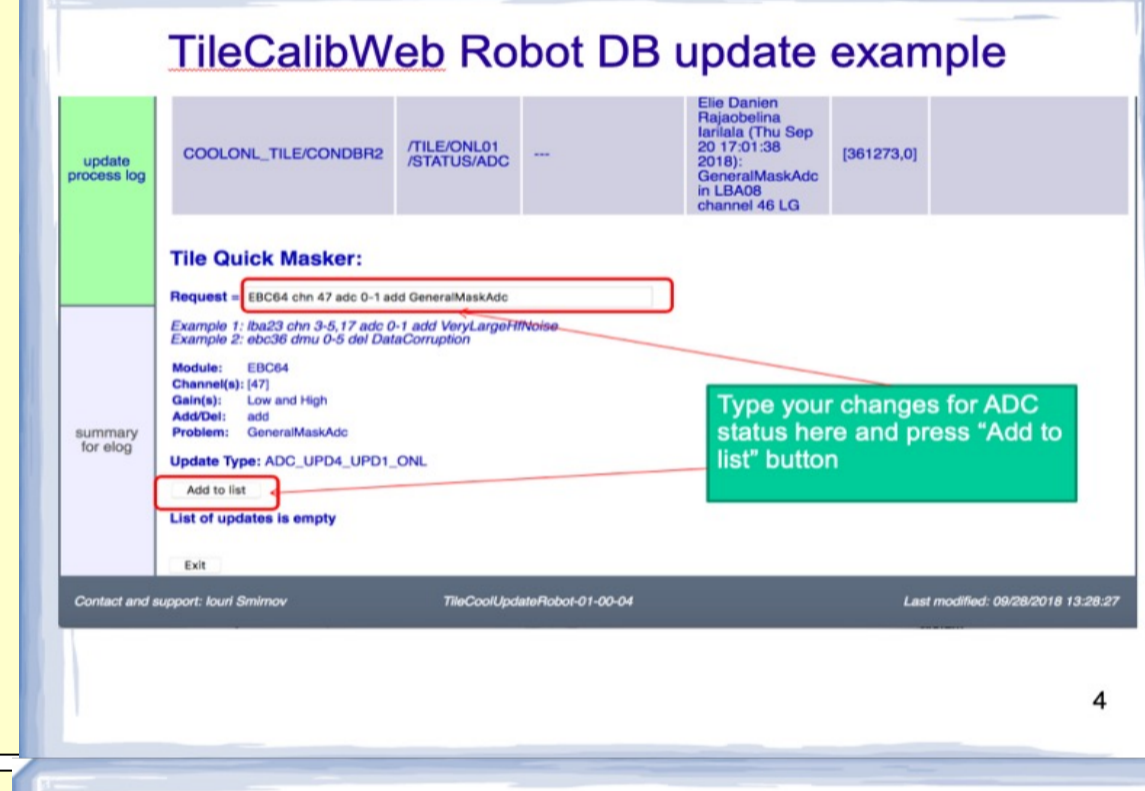
- After clicking on Robot icon if the URL slot is occupied by another user, you can use a new non-occupied URL from the list.
- Scroll to the right and click on "ADC_UPD4_UPD1_ONL" button.



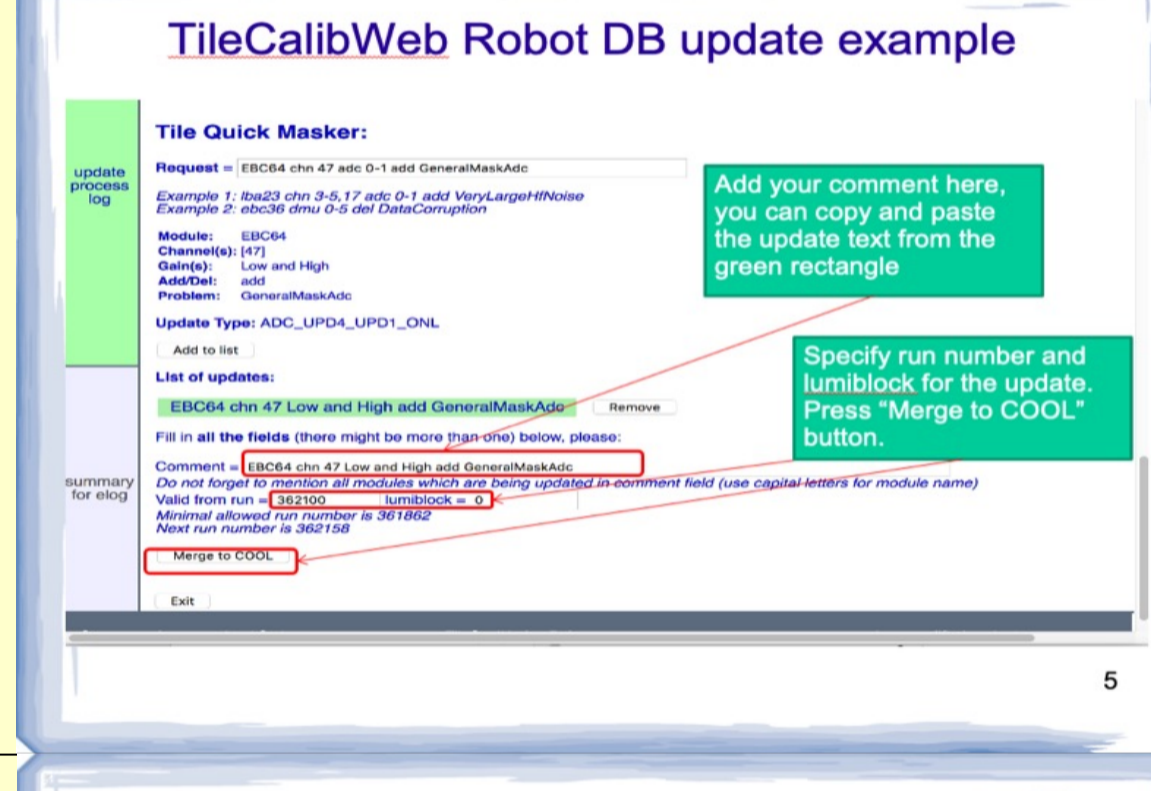
- Scroll down and follow the instructions on bottom of the screen.
- Press "Write and Update" button.
- A new pop-up window will appear on the screen.



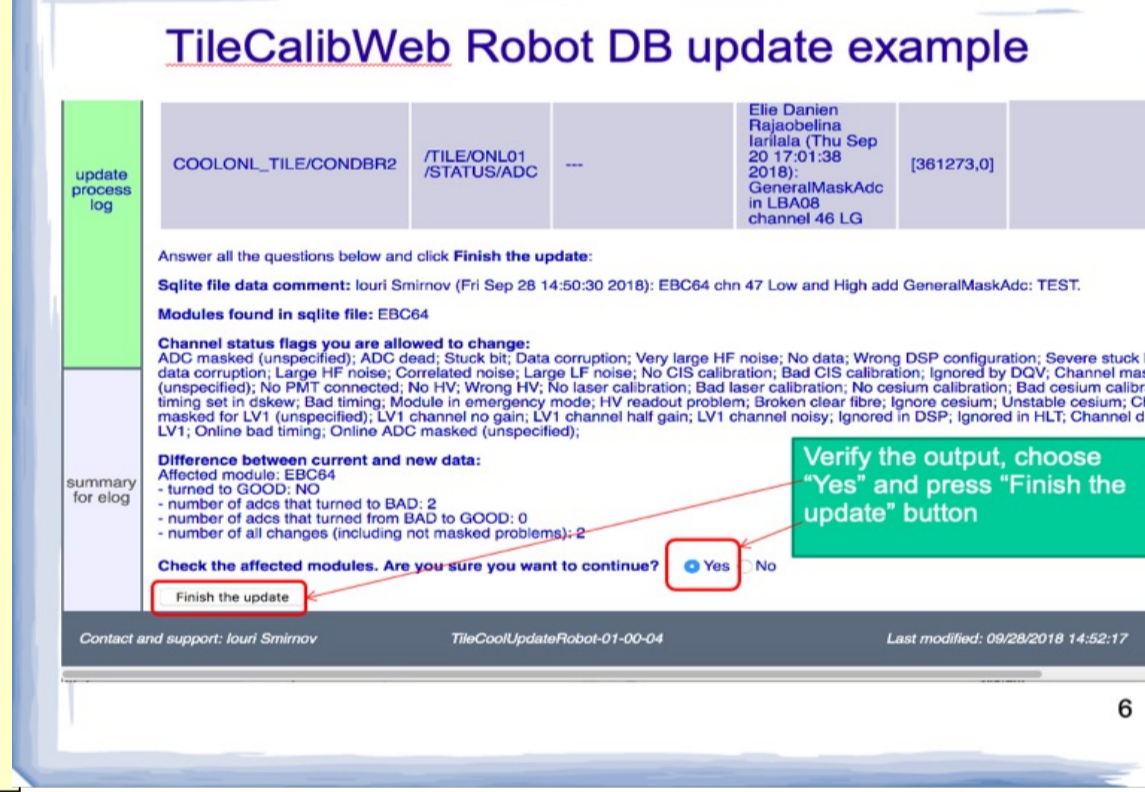
- Fill in "Request" the data for masking
- Use "Add to list" button.
- Robot adds your request to the update list and the new window appears.



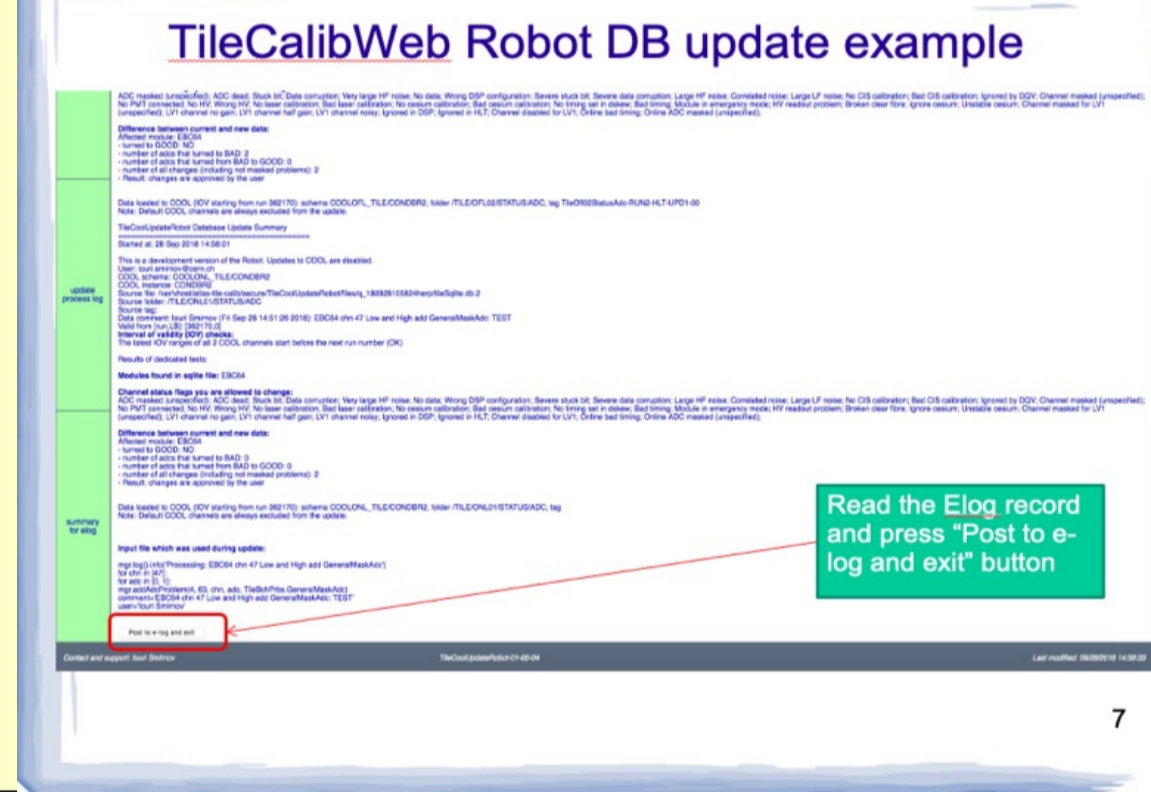
- Add into "Comment" the information about your action.
- Into "Valid from Run" field add run number with the calibration loop.
- Set "Lumblock" value, press "Merge to COOL" button.



- Robot verifies the data for the update, compares with DB, creates intermediate Sqlite files and uploads into Oracle
- Check the output information, if it is correct mark "Yes" and press "Finish the update" button



- After uploading finishes, Robot creates a new Elog record for bookkeeping.
- Read and verify Elog information about your DB update
- Click "Publish Elog and exit" button. The new Elog record will be automatically generated and published by Robot, notification on the action will be submitted to the list of experts.



5. Implementation details

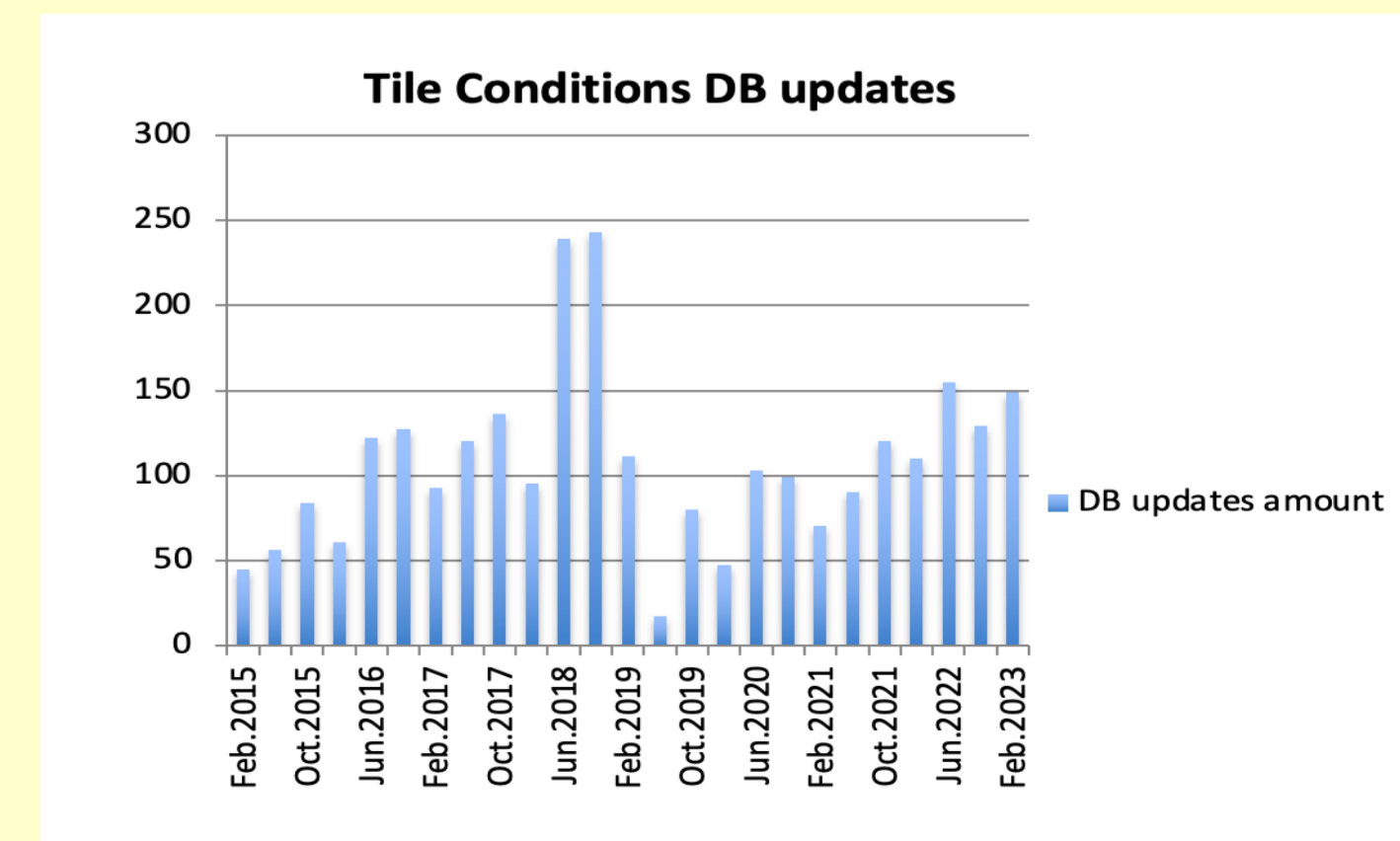
- TileCalibWeb Robot package has been written in Python and in addition uses some JavaScript, HTML, CSS, Shell modules and scripts.
- Uses ATLAS Athena release environment, some C++ classes for conditions formats and other tools for writing into COOL ORACLE DB.
- 2 production Robot servers and one development run on CentOS7, the second development node is in the process of migration from CentOS8 to AlmaLinux-9 operation system at CERN.
- Created as a standalone tool for conditions handling in Tile Calorimeter, extended for Calorimeter CALO conditions DB used together with Liquid Argon (LAR) Calorimeter experts.

DB update	Request	Comment	Status	Folder
ADC_UPD4_UPD1_ONL	Request: [Request text]	Comment: [Comment text]	Yes	TileCalibWeb
ADC_UPD4_UPD1_ONL	Request: [Request text]	Comment: [Comment text]	Yes	TileCalibWeb
ADC_UPD4_UPD1_ONL	Request: [Request text]	Comment: [Comment text]	Yes	TileCalibWeb
ADC_UPD4_UPD1_ONL	Request: [Request text]	Comment: [Comment text]	Yes	TileCalibWeb
ADC_UPD4_UPD1_ONL	Request: [Request text]	Comment: [Comment text]	Yes	TileCalibWeb
ADC_UPD4_UPD1_ONL	Request: [Request text]	Comment: [Comment text]	Yes	TileCalibWeb
ADC_UPD4_UPD1_ONL	Request: [Request text]	Comment: [Comment text]	Yes	TileCalibWeb
ADC_UPD4_UPD1_ONL	Request: [Request text]	Comment: [Comment text]	Yes	TileCalibWeb
ADC_UPD4_UPD1_ONL	Request: [Request text]	Comment: [Comment text]	Yes	TileCalibWeb
ADC_UPD4_UPD1_ONL	Request: [Request text]	Comment: [Comment text]	Yes	TileCalibWeb

- Can be easily extended to work with the other folders in CALO DB and LAR DB in the future. Development work on that has already begun for Run 3.

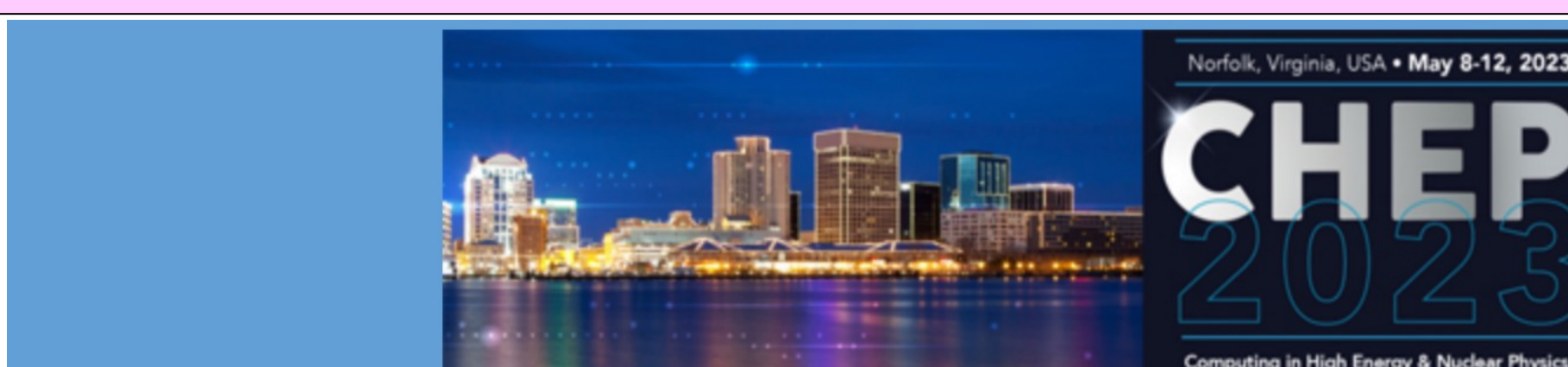
6. Deployment in Run 3

- TileCalibWeb Robot allows updating 2 different types of conditions tags in the Offline DB: UPD1 (used for express stream data processing at Tier0) and UPD4 (used for bulk reconstruction and data reprocessing), as well as the single tag for the Online DB.
- 4 types of DB updates can be executed with different buttons in the tool for Run 3: a) single update of one tag, b) double: update of 2 tags in the DB folder, c) update of 3 tags in parallel, c) update of 4 tags for noise (3 for Tile and 1 for CALO).



- Implementation of the new buttons capable to execute simultaneous updates of several tags allowed us to decrease significantly (approximately by 40%) the amount of the necessary regular manual DB updates executed by the shifters and experts in Run 3.

References: [1] Y.Smironov, D.Chakraborty, A.Solodkov, S.Harkusha, ATLAS Tile Calorimeter Conditions Database architecture and operations in Run 2, EPJ Web of Conferences **245**, 02006 (2020)



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