Data Acquisition and Management at European XFEL

Krzysztof Wrona[1*], Nasser Al-Qudami[1], Djelloul Boukhelef[1], Stefan Dietrich[2], Uwe Ensslin[2], Martin Gasthuber[2], Juergen Hannappel[2], Birgit Lewendel[2], Luis Maia[1], Janusz Malka[2], Maurizio Manetti[1], Gianpietro Previtali[1], and Janusz Szuba[1]

[1]*European XFEL GmbH, Holzkoppel 4, 22869 Schenefeld, Germany*

[2]*DESY, Notkestrasse 85, 22607 Hamburg, Germany*

[*]*krzysztof.wrona@xfel.eu*

European XFEL is the world's most brilliant X-ray free-electron laser designed to deliver up to 27.000 ultrashort (<100 fs) spatially coherent X-ray pulses in the energy range between 0.25 and 20 keV. The laser pulses are utilized by experiments in various scientific domains. The facility entered the operation mode in the middle of 2017 and first users have already performed their experiments. Usage of highly advanced instruments and detectors results in extremely high data rates that can exceed tens of GB/s. Data which originates at various detectors and sensors are collected and merged to provide consistent set of information suitable for further processing. Ensuring the integrity of data while it is transferred, stored, and archived becomes complex task when dealing with multiple data streams, very high data rates and large accumulated data volumes. Together with various privacy policies placed on the experiment data, optimal access to data requires careful selection of scalable tools, networks, storage, archive, and data access standards. We will present the architecture of the DAQ and Data Management system as well as the experience we gained during the early users' experiments.