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Future Archiver for CERN SCADA Systems

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Abstract

The paper presents the concept of a modular and scalable archiver (historian) for SCADA systems at CERN.
By separating concerns of archiving from specifics of data-storage systems at a high abstraction level, using a clean and open interface, it will be possible to integrate various data handling technologies without a big effort. The frontend part, responsible for business logic, will communicate with one or multiple backends, which in turn would implement data store and query functionality employing traditional relational databases, as well as modern NOSQL and big data solutions, opening doors to advanced data analytics and matching the growing performance requirements for data storage.

Presented work is conducted in collaboration with ETM/Siemens (vendor of WinCC OA SCADA system) in the scope of CERN openlab project.

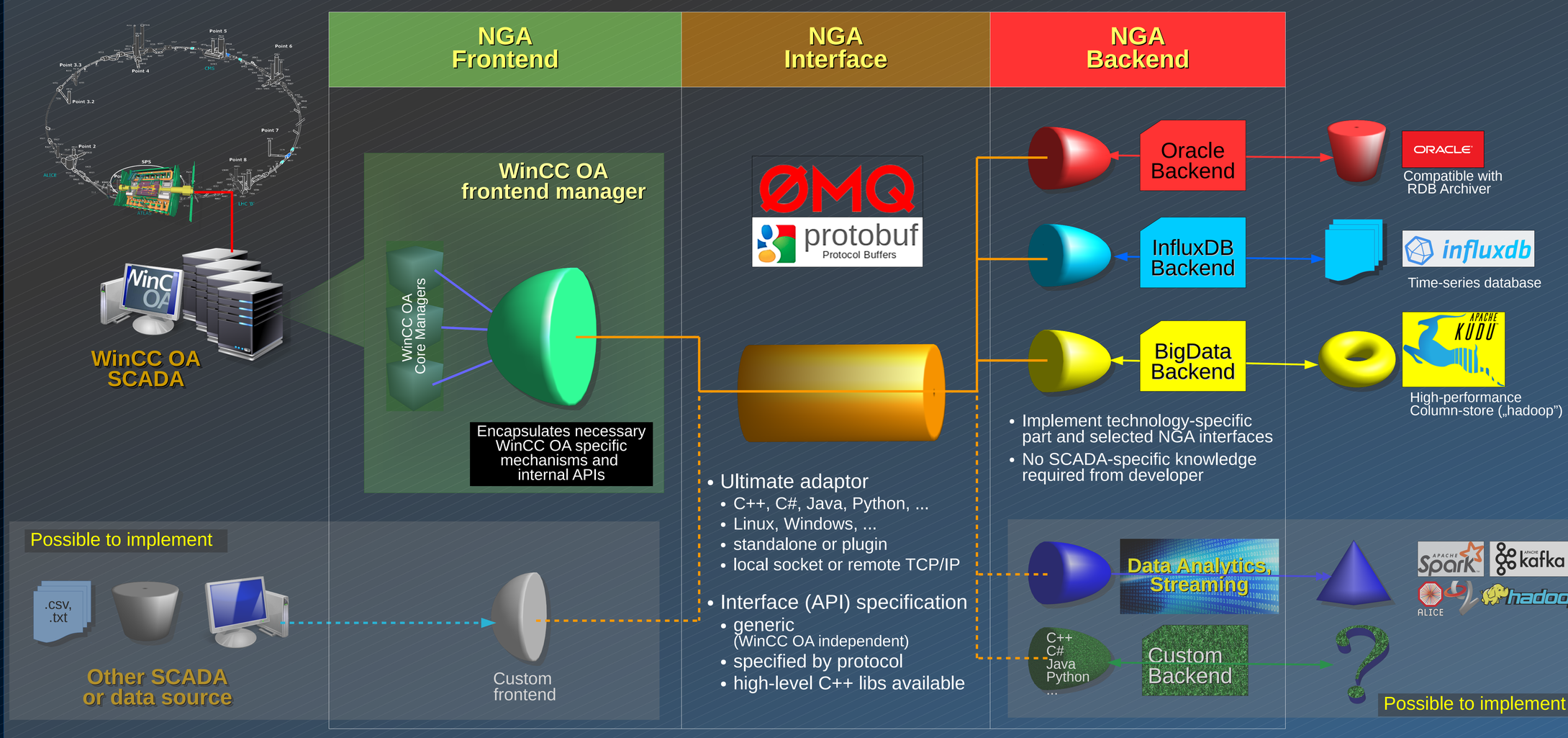
Motivation

- Ramp of the LHC luminosity
  - → higher data throughput for control systems
- Need for successor of aging WinCC OA archivers
  - → Oracle RDB Archiver, file-based „Valarch” archiver
- Rapid changes in data store and processing technologies
  - → Hadoop, Kudu, InfluxDB, ElasticSearch, ...
    available through CERN central services already now
  - → New technologies emerging quickly
- Industry 4.0
  - → ”Smart control systems” require data analytics and Big Data processing
- Cost-optimized alternative(s) to Oracle storage

Requirements

- Scalability and performance
  - → matching the needs of upgraded LHC and future proof
  - → improvements on problematic use cases: trending, event screen, event replay
- New features
  - → modern technologies for data storage/processing (SQL/NOSQL)
  - → data analytics at Big Data scale
  - → parallel archiving to many databases
- Flexibilty
  - → quick integration of new storage technologies without WinCC OA expertise
  - → no limition of platform (OS) and programming languages
- Compatibility
  - → notably with data already stored with the Oracle RDB Archiver

Modular and open architecture of the **N**ext **G**eneration **A**rchiver



Status and Outlook

- Functional prototype of the WinCC OA frontend manager and 3 backends available, with limited set of features
  - Writing/reading value changes and meta data, configuration and monitoring interfaces
- Proof-of-concept of a custom frontend and a reference backend
- Architecture fulfils expectations and functional requirements
- Scalability and performance tests in preparation
- New use cases become possible: data forwarding, parallel archiving (see e.g. TUMPL10)

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