



CWG13 Introduction

04/04/2014

P.Hristov

CWG13



Members

- ▶ AL-TURANY, Mohammad
- ▶ CHAPELAND, Sylvain
- ▶ CHIBANTE BARROSO, Vasco
- ▶ GHEATA, Andrei
- ▶ GORBUNOV, Sergey
- ▶ GROSSO, Raffaele
- ▶ HRISTOV, Peter
- ▶ HRIVNACOVA, Ivana
- ▶ KOUZINOPOULOS, Charalampos
- ▶ READ, Kenneth
- ▶ RICHTER, Matthias
- ▶ SHAHOYAN, Ruben
- ▶ VON HALLER, Barthelemy

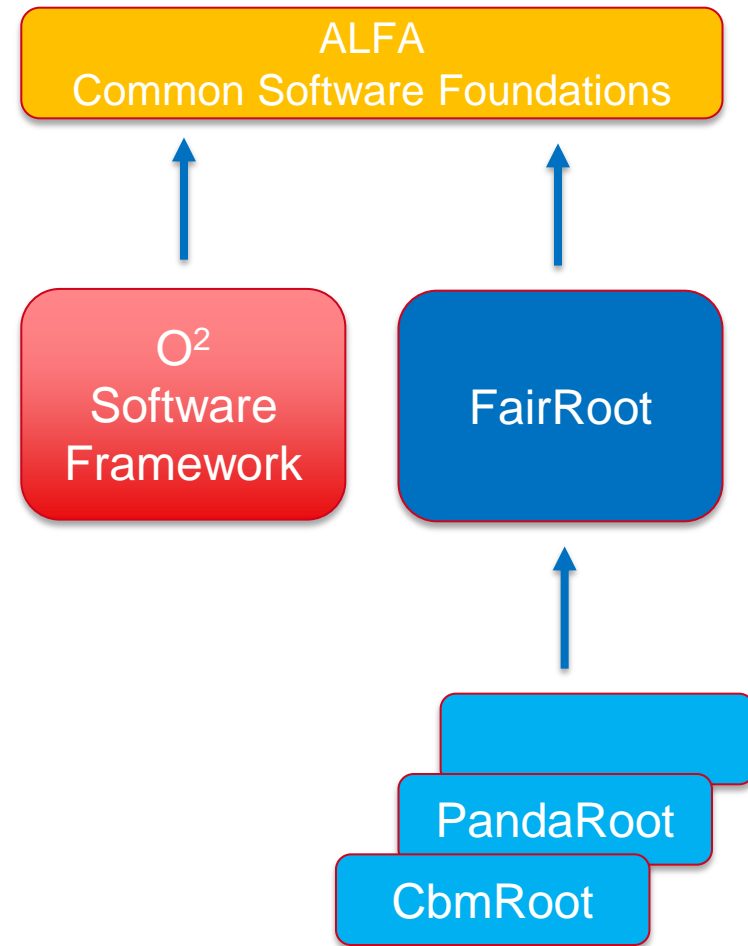
Organization

- ▶ **Meetings: Friday, 11:00**
 - ▶ Weekly or bi-weekly
- ▶ **Git repositories**
 - ▶ <https://git.cern.ch/repos/o2protocol>
 - ▶ <https://git.cern.ch/repos/alice-o2-cwg13>
- ▶ **Mailing list**
 - ▶ alice-o2-cwg13@cern.ch
- ▶ **Planning: JIRA**

CWD13 Objectives



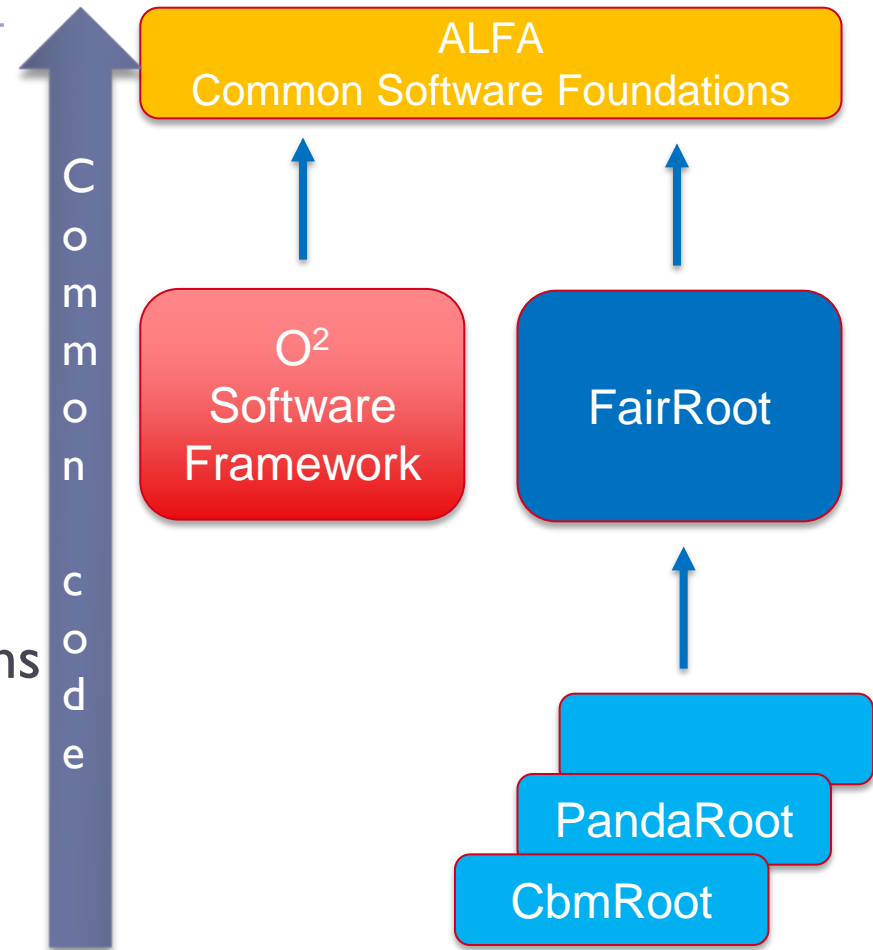
- ▶ **Design** and development of a new modern framework targeting Run3 (**CWGI-CWGI2**)
- ▶ Should work in Offline and Online environment
 - ▶ Has to comply with O² requirements and architecture
- ▶ Based on new technologies
 - ▶ Root 6.x, C++11
- ▶ Optimized for I/O
 - ▶ New data model
- ▶ Capable of utilizing hardware accelerators
 - ▶ FPGA, GPU, MIC...
- ▶ Support for concurrency in an heterogeneous and distributed environment
- ▶ Based on ALFA - common software foundation jointly developed between ALICE & GSI/FAIR
- ▶ **Strong collaboration with the other CWGs**





What is ALFA?

- ▶ 4 slides from the [presentation](#) of Mohammad at the Annual Concurrency Forum, 01/01/2014
 - ▶ Common layer for parallel processing.
 - ▶ Common algorithms for data processing.
 - ▶ Common treatment of conditions database.
 - ▶ Common deployment and monitoring infrastructure.



ALFA



- ▶ Will rely on a data-flow based model (Message Queues).
- ▶ It will contain
 - ▶ Transport layer (based on: ZeroMQ, NanoMSG)
 - ▶ Configuration tools
 - ▶ Management and monitoring tools
- ▶ Provide unified access to configuration parameters and databases.
- ▶ It will include support for a heterogeneous and distributed computing system.
- ▶ Incorporate common data processing components

ALFA: Design constraints



- ▶ **Highly flexible:**
 - ▶ Different data paths should be modeled.
- ▶ **Adaptive:**
 - ▶ Sub-systems are continuously under development and improvement
- ▶ **Should work for simulated and real data:**
 - ▶ Developing and debugging the algorithms
- ▶ It should support all possible hardware where the algorithms could run (CPU, GPU, FPGA)
- ▶ It has to **scale** to any size! With minimum or ideally no effort.



ALFA: Current Status

- ▶ The Framework delivers some components which can be connected to each other in order to construct a processing pipeline(s).
- ▶ All components share a common base called Device
- ▶ Devices are grouped by three categories:
 - ▶ **Source:**
 - ▶ Data Readers (Simulated, raw)
 - ▶ **Message-based Processor:**
 - ▶ Sink, Splitter, Merger, Buffer, Proxy
 - ▶ **Content-based Processor:**
 - ▶ Processor
- ▶ ALFA will be discussed in more details during one of the next meetings



O² Prototype: Complementary approaches



“Offline”

- ▶ Simulation (ITS + TPC) in FairRoot environment
 - ▶ Creation of hits (MC points)
 - ▶ Use of Geant4 w/wo multithreading, comparison (CWG8)
- ▶ Digitization in time frames
 - ▶ Use of (0MQ) multiprocessing
- ▶ Creation of raw data in Run3 format (CWG4)
 - ▶ Simulated from digits
 - ▶ Emulated from existing raw

“Online”

- ▶ Setup of test nodes (CWG1, CWG12)
- ▶ Hardware and software data generation
 - ▶ See the “offline” part
- ▶ Control, configuration and monitoring (CWG10)
 - ▶ ALFA components + control software

O² Prototype: Complementary approaches



“Offline”

- ▶ Use of **CWG5 + CWG7** demonstrators to process (reconstruct) the raw data
- ▶ Add more detectors (i.e. the ones in triggered mode) in the simulation
- ▶ GOTO digitization, creation of raw data, reconstruction
- ▶ Put some calibration algorithms in the processing (**CWG6**)

“Online”

- ▶ Data transport and fan-in, event-building (**CWG3**)
 - ▶ Use of generated raw data
- ▶ Data access for processing, monitoring, QA (**CWG9**)
- ▶ Data storage



“Methodology”

- ▶ **Merits of fast prototyping (Pierre)**
 - ▶ Quick verification of basic ideas
 - ▶ Common work which will feed in the O2 and ALFA code repositories
 - ▶ Input for the TDR
 - ▶ Some developments could be directly usable for Run 2
- ▶ **Technical questions, see also the [presentations](#) during the offline week (Friday, 21/03/2014)**
 - ▶ Git workflow (CWG11): we can try Gitlab
 - ▶ Coding style (CWG2): lets follow since the beginning
 - ▶ C++11 ? Root6 : Root5;
 - ▶ JIRA project type

Training

▶ @CERN

- ▶ CERN openlab / Intel Parallelism, Compiler and Performance Workshop: 12-May-14 to 14-May-14
- ▶ CERN openlab/Intel Workshop on Numerical Computing: 05-May-14 to 06-May-14
- ▶ Hands-On Modern C++: Making the most of the 11/14 standards
- ▶ Agile Project Management with Scrum
- ▶ Introduction to VHDL

▶ Text books, manuals, lectures

- ▶ Please share your favorite links

Proposed actions for the next 2 weeks



- ▶ JIRA project, Git workflow (Peter)
- ▶ Creation of MC points for ITS and TPC (Charis, Mohammad, Andrei)
- ▶ Description of the Run3 raw data structures: extension of event.h (Andrei, Peter)
- ▶ Preparation of test nodes (Barth, Sylvain, Vasco)
- ▶ Detailed presentation on ALFA (Mohammad, Anar)
- ▶ Ideas about the condition data base in Run3 (Raffaele)
- ▶ Presentation on the ITS & TPC reconstruction components for Run3: cluster finder, fast tracker, track fit (Sergey, Ruben)
- ▶ Next meeting 11/04/2014

Backup



Collaboration with the other CWGs



- ▶ CWG 1 - Architecture
- ▶ CWG 2 - Tools and Procedures
- ▶ CWG 3 - Dataflow and Condition Data
- ▶ CWG 4 - Data Model
- ▶ CWG 5 - Computing Platforms
- ▶ CWG 6 - Calibration
- ▶ CWG 7 - Reconstruction
- ▶ CWG 9 - QA, DQM, Visualization
- ▶ CWG 8 - Physics Simulation
- ▶ CWG 10 - Control, Configuration & Monitoring
- ▶ CWG 11 - Software Lifecycle
- ▶ CWG 12 - Computing Hardware