

D. D'Urso¹, M. Durante², P. Zuccon³

¹ INFN and ASDC, via del Politecnico snc, 00133 Roma, Italy

² University of Perugia and INFN, via A. Pascoli, 06123 Perugia, Italy

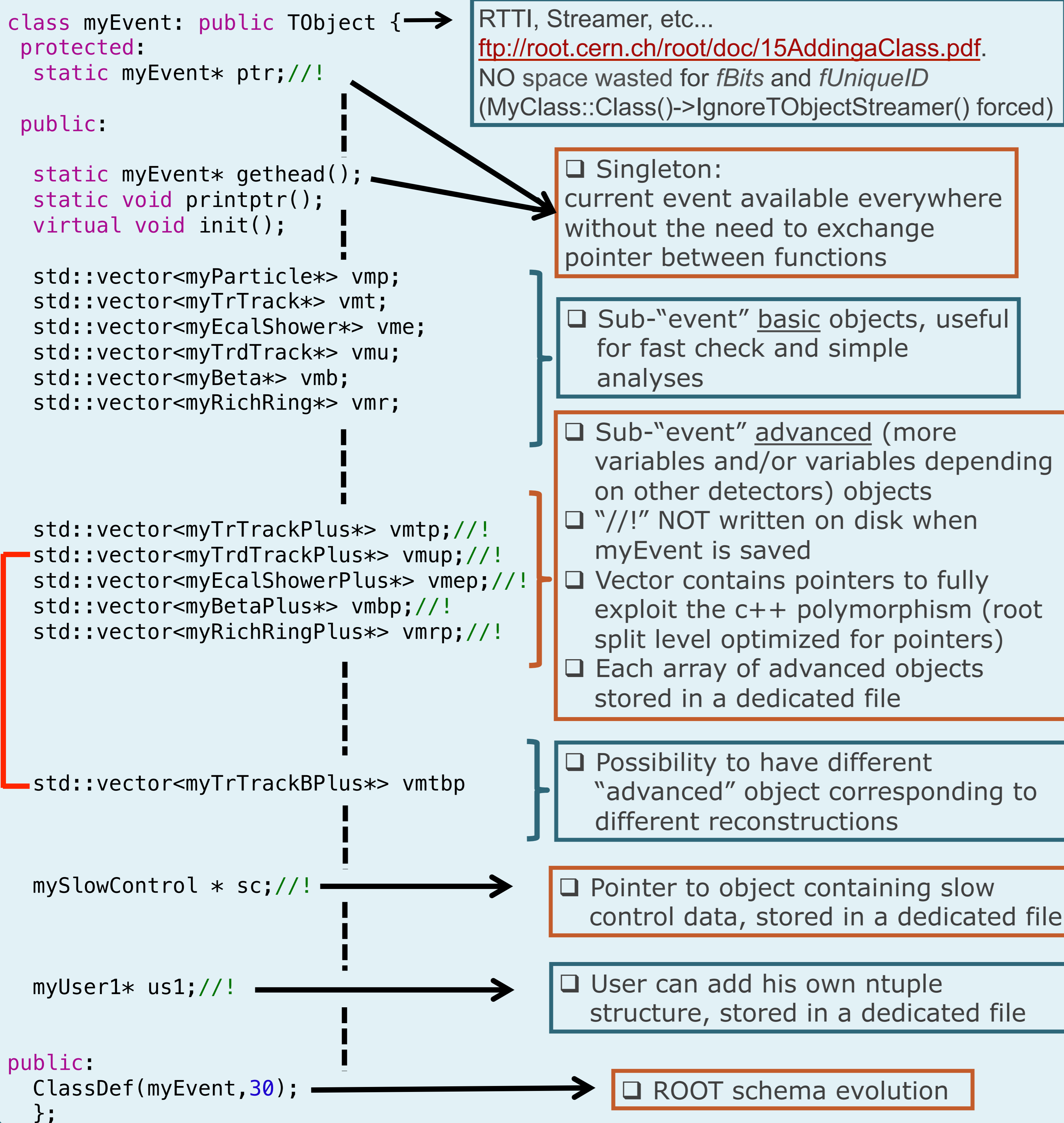
³ Massachusetts Institute of Technology, MIT, Cambridge, MA 02139, USA

Introduction

Data access and availability is a crucial issue in high energy physics experiments, given the huge amount of data produced. A flexible and modular data format implementation for HEP applications is presented. Designed to face HEP data issues, the implementation, developed for AMS^a data, is based on the CERN ROOT^b toolkit:

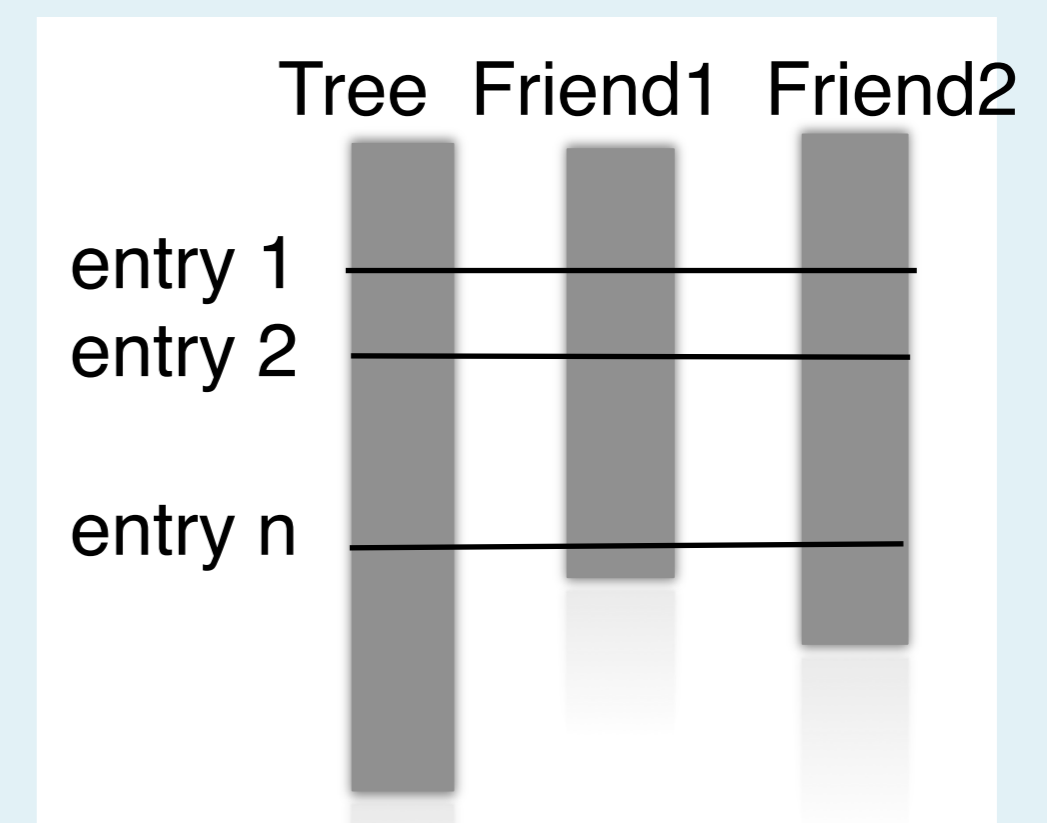
- ❑ data format designed to be modular and easily upgradable and extendable;
- ❑ event information split into different files in a transparent way for the final user;
- ❑ use of the ROOT TTree “friendship” and of the C++ inheritance to implement a modular and flexible design;

Event Structure

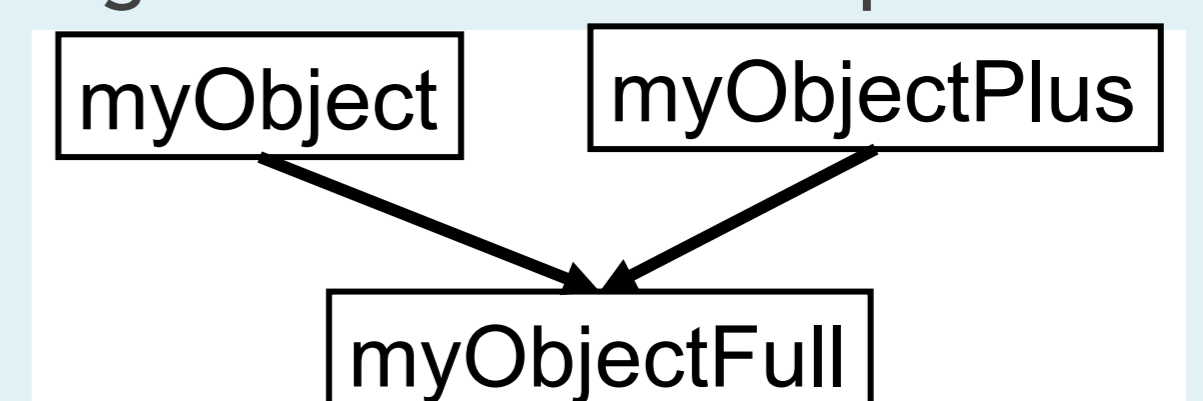


Data access

- ❑ Main data file containing the myEvent data object with sub-event basic object attached to. All accessory files, with “advanced” objects into, are managed by a customized TChain, loading on demand the needed objects.
- ❑ Event information from accessory files are retrieved by means of the TTree friendship.



- ❑ User can load just needed trees.
- ❑ If a re-production is needed for a few variables, only related data files have to be re-produced.
- ❑ By means of a double inheritance, full set of information contained in both the basic and the advanced object is available with a single common interface, avoiding a data member replication



Conclusions

- ❑ Designed to be modular, upgradable and extendable.
- ❑ Event data are split into several files that may contain different parts of event (i.e. different sub-detectors) or different level of abstraction (i.e. from raw information to the highest level quantities).
- ❑ Due to its modularity, it is suitable for a mini-DST format as well as a complete data format.
- ❑ Easily upgradable without a full reprocessing.
- ❑ TTree simple functionality preserved (i.e. TTree::Draw()).
- ❑ File splitting allows a very efficient distribution and upgrade of data to the regional Data Centers, as well as the possibility to download and process a small fraction of event information, even on the user laptop

References

- a) M. Aguilar et al., Physical Review Letters 110, 141102 (2013).
 b) Rene Brun and Fons Rademakers, *ROOT - An Object Oriented Data Analysis Framework*, Proceedings AIHENP'96 Workshop, Lausanne, Sep. 1996, Nucl. Inst. & Meth. in Phys. Res. A 389 (1997) 81-86. See also <http://root.cern.ch/>.